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ISLANDS

of the PACIFIC

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By

HAWTHORNE DANIEL

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To

Major William J. Morden

U. S. Army Air Force

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Introduction

SO GREAT ARE the distances between California and Australia, between South America and Japan, and so vast is the expanse of the Pacific Ocean, that it is difficult to express in terms that can be readily grasped the immensity of that gigantic space. It is no aid to one's imagination to say that the Pacific is 68,634,000 square miles. Even *one* square mile is difficult for many of us to visualize.

On that account it might be well to attempt some other measurement. For instance, it would take 258 states the size of Texas to equal the area of the Pacific Ocean, which is 33 times as great as our whole country.

In fact, the Pacific is enormously greater in area than are all the land masses of the world combined. Europe and Asia, Africa and Australia, North and South America, together with all the islands of all the seas, fall short by about four times the area of the United States of equaling this greatest of the world's oceans.

This book devotes itself to the islands of that vast sea. For the most part, however, it does not deal with the great island groups, such as the Dutch East Indies or the Philippines, except in passing. These have been amply described elsewhere.

The following pages deal with the lesser islands of the Pacific—with the island groups, the coral atolls, the peaks of subterranean mountains where they rise above the sea. There are thousands of them, some of considerable size and of real economic importance. Their people may be savage, or barbaric, or civilized. Their development may be fragmentary or reasonably complete. Some have long been

on major sea routes of the world, while others may be visited, even yet, only at long intervals by wandering trading schooners. Nowadays some are important military outposts, or may be "division points" on the aerial highways that are more and more coming to criss-cross this watery half of the world.

These islands range in size from low-lying bits of land barely rising above the level of the sea, to islands on which jungle-covered mountains tower thousands of feet above the breakers on their beaches. Some are rich in agricultural and mineral wealth, have excellent harbors for large ships, and support cities, plantations, tourist resorts, and mines; while others are actually unpopulated, or support mere handfuls of people.

The history of a few of them goes back to the days of Magellan, who first crossed this great ocean. Captain Cook found scores of them about the time of the American Revolution. Wandering American whalers placed others on the charts, and scores of accidental landfalls little by little placed others there.

Luckily these islands tend, for the most part, to fall into groups, and in this volume they are treated as groups save as, here and there, a few stand clearly alone.

Their inhabitants vary more than a little, but are often closely related over very wide areas, for most of these islanders take naturally to the sea, and even in their native boats have frequently been willing to voyage great distances.

No large animals are native to these islands, but small ones sometimes abound. The vegetation may be limited to a fringe of coconut palms and little else, or on certain larger islands forms lush and impenetrable jungles.

That there are climatic variations in so great a region goes without saying, yet there is probably less variation throughout the Pacific than in any other comparable area

on earth. Rainy seasons come and go. The trade winds, over much of this portion of the earth, are almost as regular as clockwork. Now and then furious storms batter these islands, tearing down structures and trees, wrecking native craft and even larger ships, and inundating low-lying islands. For the most part, however, the weather is pleasant, the temperature mild, and the winds moderate.

For all these generalities, each island group has attributes that are quite its own, and the more important and interesting of these traits go to make up this book. So varied are these islands that no catalog—no frozen pattern—of facts will be attempted. Nevertheless, limited though the following text intentionally is, the essential facts concerning location and physical appearance, climate and topography, fauna and flora, peoples, languages, government, and resources are included. Strategic importance, too, both in commerce and in war, is an essential part of the picture, and though each island group offers more than enough material for many volumes, it is to be hoped that this single book—for all its limitations—presents a somewhat rounded picture of them all.

For the most part, until now, these islands have had a kind of separate existence of their own. The world at large has had little contact with them, and some at least have given the impression of being imaginary rather than real. Today, however, they are rapidly coming to take their place along with the larger islands in the great world of which, almost for the first time, they are a part.

Beginning with Hawaii and the related islands of that portion of the sea, this book will follow in outline a great curve clockwise through the Pacific, ultimately reaching its farther side and returning by way of the Philippines, Japan, and the Aleutians. We'll begin and end, in other words, on American territory. In between lie these islands of the great Pacific area.



ISLANDS

of the PACIFIC

CHAPTER ONE

Hawaii to Midway

A LINE DRAWN from northern Japan diagonally southeast to the southern tip of South America divides the Pacific Ocean into two very different parts. To the west and south lies such an extraordinary scattering of islands as to suggest that Nature sowed them broadcast there with a lavish hand. To the east and north, however, it is easy to imagine that she had all but exhausted her supply—that few remained to be planted in the almost endless sea.

There are, of course, the islands that lie near the coasts of North and South America—the Queen Charlotte, the Galapagos, Juan Fernandez, and a few others. Some of these, too, are reasonably remote in their surrounding emptiness of ocean. And yet they seem to have a sort of continental relationship and, by that much, are removed from the category in which most Pacific islands properly belong.

Aside from these, few islands except the Hawaiian group and the Aleutians lie in all that portion of the Pacific on the American side of the line from Japan to Cape Horn. These two archipelagoes in the vast “unpopulated” portion of the world’s greatest ocean are the two island groups that form the subjects for the first and the last chapters of this volume.

Honolulu, the capital of the Territory of Hawaii, is 2,089 miles from San Francisco, and lies farther to the south than any point in continental United States. It is

H A W A I I A N

KURE I.

MIDWAY I.

PEARL AND HERMES REEF

LAYSAN I.

LINE ISLAND

GARDNER I.

NECKER I.

NIHOA

KAUAI

MAUI

MOLOKAI

LANAI

Honolulu

Pearl Harbor

KAHOOLAWE

Kealahou

HAWAII

south even of the latitude of Havana, Cuba, and lies a full thousand miles nearer the equator than does San Francisco, which is the closest city on "the mainland."

The eight major islands of the Hawaiian group—Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Niihau and Kahoolawe—form only a part, though by far the larger part, of the Territory of Hawaii. In addition to these the group includes more than a score of lesser islands, islets, and reefs, and the whole chain forms a peculiarly straight line that begins with the largest and most southeastern island—Hawaii—and ends, 1,578 miles to the west-northwest, with Kure Island, one of the smallest. The eight major islands of the group form the southeastern 375 miles of the chain, and measure 6,406 square miles in area. It is on these that all but the merest handful of the 465,000 people of Hawaii dwell. The lesser islands—and the islets—that lie to the west are, altogether, only *six* square miles in area.

The group is volcanic in origin, and the larger islands are ruggedly mountainous. Lying in the region of the northeast trade winds, the islands are abundantly watered on the slopes against which these moisture-laden winds so regularly blow. On the leeward—southwestern—slopes, however, and on certain low-lying sections, less rain falls, and irrigation is sometimes necessary. The soil is fertile, the vegetation tropical, and the climate is pleasant and equable.

The Island of Oahu

Oahu is third in size among the islands, and fifth in elevation, but because of Honolulu and the island's great military establishments, as well as because of its well-developed agriculture and considerable population (310,000), it is quite the most important of the group.

Roughly quadrilateral in shape, and approximately 22 by 35 miles in size, Oahu once consisted of nothing more than two immense volcanoes. In the ages that have passed,

these two creators of the land they occupied have been eroded into two parallel mountain ranges. One of these—the longer—is the Koolau (East) Range. The other, a dozen miles or so away across the island's central valley, is the shorter Waianae, or West, Range. The former of these rises abruptly from a coastal strip of lower land, and forms an almost unbroken and nearly vertical wall for 30 miles close to the northeast coast. The peaks and cliffs, the ravines and waterfalls, the tropical vegetation and the great central valley lying between the two rugged ranges combine to present one of the most striking regions in the archipelago.

Agriculturally Oahu is important, with sugar cane and pineapple the principal crops. Commercially it is the center of the group, and because of Honolulu, the territory's largest city, is far ahead of the other islands. Tourists, too, come to Oahu in largest numbers, and on this island are the Army's great Schofield Barracks and the Navy's huge base at Pearl Harbor.

Schofield Barracks lie on the western side of the great central valley in the interior of the island, but Pearl Harbor and Honolulu are on the southern coast. Waikiki Beach, to which so many tourists are attracted, lies between Honolulu and famous Diamond Head, a mountainous projection on the coast some 5 miles southeast of the capital. Pearl Harbor and the harbor of Honolulu are the only natural harbors of any importance on any of the islands, but Pearl Harbor is one of the finest in the Pacific.

The greater part of the coast of Oahu is surrounded by a coral reef, often half a mile wide. Here and there, ancient sections of reef, heaved up by prehistoric seismic disturbances, form a part of the land.

The seven other major islands of the group, which, with Oahu, form the southeastern 375 miles of the chain, really

fall into three distinct divisions: first, the island of Hawaii from which the entire archipelago takes its name and which is the final, southeastern island of the chain; second, the four islands of Maui, Molokai, Lanai, and Kahoolawe which lie close together midway between Hawaii and Oahu; and finally the closely associated islands of Kauai and Niihau which lie to the west and north of Oahu across a 75-mile-wide channel.

The Island of Hawaii

Hawaii is the largest member of the chain, and its 4,016 square miles make up almost two thirds of the area of the whole group. Roughly triangular in shape, the island's three cliff-lined sides measure 90, 75, and 60 miles in length, and its interior is mountainous and very elevated. In fact, the island is made up of five great volcanic mountains which are connected by vast "saddles" 3,000-7,000 feet high formed by overlapping lava flows.

The northernmost portion—and one angle of the triangle—consists of the 5,500-foot Kohala Range. Thirty miles to the southeast of this ridge is the peak of Mauna Kea, an extinct volcano which, with an elevation of 13,835 feet, is the world's highest island mountain. Twenty-five miles to the south of Mauna Kea towers gigantic Mauna Loa, 150 feet less in elevation than Mauna Kea but the greatest volcano and, in cubic content, the greatest mountain in the world. These two enormous mountains form the bulk of the island, with lesser Mauna Hualalai more than a score of miles to the west of Mauna Kea, and the giant crater of Kilauea 20 miles to the east of the summit crater of Mauna Loa, and 9,000 feet lower.

These mountains, of course, though measured from the level of the sea, do not rise merely from the water. Actually they stand upon a great subsea plain which lies 18,000 feet *beneath* the sea, and from *that* beginning Mauna Kea—

White Mountain, so-called from its snows—rises to a vaster height than any other mountain in the world. Within 50 miles it rises to a total height, below and above the sea, of 32,000 feet.

Mauna Loa—Long Mountain—is also unique. Unequaled as a volcano, its action is strangely individual, and its huge summit crater, which the natives call Mokuaweoweo, neither erupts explosively nor overflows. Instead, during periods of the volcano's greatest activities, this enormous pit, which is nearly four square miles in area and is surrounded by almost vertical walls 500-600 feet in height, usually merely flames and boils, after which fissures open far down the mountain's giant sides, and rivers of lava flow slowly along fairly well-defined routes, sometimes to the sea.

Mauna Hualalai has had only one eruption in historic times—in 1801—but Kilauea is continuously active. Separate in action from Mauna Loa, and apparently much older, Kilauea is, nevertheless, no longer a separate mountain. Instead it is hardly more than a vast crater on Mauna Loa's eastern slope. But it is the greatest active crater in the world. Nearly 5 square miles in area, it operates in cycles. The lava rises, drains away through subterranean passages, and subsides, to begin again.

With such vast subterranean activities forever going on, earthquakes are frequent in Hawaii. Even tidal waves occur occasionally along the island's eastern coast. But neither the earthquakes nor the tidal waves are apt to be heavy, and excessive damage from them is rare.

For the most part the surface of Hawaii consists of the somewhat gentle slopes of the five volcanoes, but the 90-mile northeastern coast is much more rugged. It is against this coast that the northeast trade winds perennially blow, and here, on the island's high eastern slopes, the moisture of these winds is precipitated.

Hawaii is what geologists call a "new" island, and on that account not much erosion is in evidence. On the northeast coast, however, the copious rains, combining with ocean waves and currents, have created spectacular valleys and cliffs. Throughout the rest of the island not a stream is to be found except during periods of exceptional rain. This is partly on account of the porosity of the volcanic rock and soil, but also—especially on the southwestern or leeward side—on account of insufficient rain.

Because of a lack of rain and the extensive lava beds, large portions of the island are barren. The greater elevations, too, are devoid of noticeable vegetation. On the northeastern coast, however, and in certain other favored spots, the verdure is widespread.

Hilo, with a population of 22,667, is the island's largest town. It is situated on the northeast coast about 20 miles from the island's most eastern extremity. Its harbor was not much more than an open roadstead until it was improved, but now it is adequate for the island's needs. Elsewhere on the island no real harbor exists.

The Islands of Maui, Molokai, Lanai, and Kahoolawe

Midway between Hawaii and the island of Oahu, and separated from each of these by channels nearly 30 miles in width, are four closely grouped islands. Once, according to geologists, these four were one, and even now they are separated by channels no more than 5 to 8 miles wide. In the order of their size, they are Maui, Molokai, Lanai, and Kahoolawe.

Easternmost and largest is Maui, and, in the entire Hawaiian group it is exceeded in area only by Hawaii. In shape, so the imaginative say, it resembles the head and bust of a woman, but that is to be seen—if seen at all—only on a map.

Made up of two mountains which are connected by a

low isthmus about 6 miles wide, is has an area of 728 square miles, yet in this somewhat limited area (its length is about 50 miles and its greatest breadth about 25) widely different conditions exist.

The larger of Maui's two mountains—Haleakala, or "The House of the Sun"—rises to an elevation of 10,032 feet. An extinct volcano, it still contains the largest of all extinct craters—an unbelievable pit 20 miles in circumference and 2,720 feet deep. Furthermore, its bold northeastern slopes cause the semiconstant trade winds to precipitate great quantities of rain, and its windward side is rich in stupendous gorges, leaping waterfalls, and vivid verdure.

Even the island's lesser mountain—Puu Kukui, which is 5,788 feet in height—is similarly well watered, eroded, and verdure clad. Its sides are marked by deep, radiating valleys, of which the most beautiful—Iao Valley—is 5 miles in length, 2 in breadth, and 4,000 feet in depth.

Yet the low isthmus, which connects these two well-watered mountains, is an arid, rainless region because its lack of elevation permits the trade winds to sweep across without precipitating their moisture. Until this isthmus was irrigated by the overabundant waters of the mountains' sides it was a wasteland all but unfit for use.

Maui has no large town, but Wailuku, the third largest in the territory, with 7,315 population, is situated on its northern coast at the mouth of Iao Valley.

Five miles southwest of Maui, and directly in the lee of Haleakala, lies the smallest of the eight major islands—the island of Kahoolawe. It is some 6 miles by 10 and is little more than a single mountain some 1,472 feet high. But it is robbed of its rains by higher Haleakala and is nearly destitute of vegetation save in the valleys where there is grass enough to permit pasturing sheep.

A barren, uninhabited, and crescent-shaped rock a mile

or so long lies in the channel between Kahoolawe and Maui. It is called Molokini Island and was once a small volcano.

Six miles west of the northwestern portion of Maui is the island of Lanai, less barren than Kahoolawe and less verdant than Maui. Roughly 11 by 18 miles in size, it receives more rainfall than Kahoolawe, for the trade winds reach it with less interruption. It, too, is essentially a single mountain, with an elevation of 3,480 feet, and it offers range for cattle, sheep, and goats. In recent years, pineapple plantations have been started there, and in Lanai Roads naval ships occasionally anchor.

The fourth island of this cluster is Molokai, which, long and narrow, lies 7 miles directly north of Lanai and about the same distance northwest of Maui. From 6 to 7 miles in width, it stretches its 40 miles of length directly east and west. Only about one third the area of Maui, it, too, is made up primarily of two mountains, which are connected by a "saddle" which forms the island's somewhat sway-backed backbone.

Mauna Loa (a far smaller Mauna Loa than the one on the island of Hawaii) reaches the limited elevation of 1,382 feet at the island's western end, and Kamakou (4,958 feet) stands well to the east of the center. Greatly narrowed by erosion, for the island stands directly in the path of the trade winds and obtains its full share of rain, Molokai has, in the course of time, so shaped its northern coast as to present to the elements a sheer and magnificent precipice that stands from 500 to 4,000 feet above the surf. Into the very highest portion of this rampart a series of verdant valleys has been cut, and from the foot of the cliff, near its central portion, a low peninsula projects 3 miles into the Pacific. Cut off from the rest of the island by the coastal cliff, which here is about 2,000 feet in height, this peninsula forms most of the county of

Kalawao, wherein lies the island's famous leper colony.

The southern side of Molokai is gradual in its slope, though it is cut by many narrow ravines. The island is less productive than either Maui or Oahu, between which it lies, but richly productive agricultural lands lie on its lower, southern slopes. Nevertheless, as a whole, Molokai is less verdant than either of its greater neighbors. It has no town of any size, but nine or ten tiny villages are dotted along its coast.

The Islands of Kauai and Niihau

Sixty-three miles west-northwest from the island of Oahu, and 100 miles from Honolulu, lies the roughly circular island of Kauai. Somewhat smaller than Oahu, its area is 547 square miles, and it consists, primarily, of a single mountain, with an elevation of 5,250 feet, and its marginal lowlands.

It is the oldest of the larger islands and, at the same time, supports the heaviest growth of vegetation. The trade winds bring heavy rains to Kauai which stands clear of all the other islands, and its central peak has more rain than almost any other portion of the archipelago.

Because of the heavy rains, the island is the most eroded of the group, with many deep valleys, canyons, pinnacles, fluted ridges, and waterfalls. One of its most remarkable features is the Grand Canyon of the Waimea which, 3,000 feet deep, forms, in the southwestern section of the island, a giant landmark comparable both in form and coloring to the Grand Canyon of the Colorado. In the north is the great Hanalei Valley, and on the northwest coast stand the extraordinary Napali precipices.

Frequently called "the garden isle" by its inhabitants, its population is not large and Lihue, with only about 4,250 population, is the largest town.

The smaller island of Niihau, 22 miles west of Kauai, is

the last of the large islands of the territory and, except for Kahoolawe, the smallest. Approximately a third of its 73 square miles is tableland, from which a small mountain rises to an elevation of about 1,500 feet. Cliffs line a part of its eastern coast, and the western two thirds of the island consists of a low plain, partially formed of an up-lifted coral reef. Lower, less well watered, and covered more largely with grass than Kauai, Niihau is given over almost entirely to the raising of sheep. Its population is small—so small, in fact, that nothing that might be called a town exists on the island.

The little island of Lehua lies just off the northern tip of Niihau, and about 20 miles southwest of the larger island is similar Kaula. Both are merely the remains of long-inert tufa cones. On the former of these, 707 feet above the sea, is Lehua Lighthouse, one of the most elevated in the world.

The Lesser Islands of the Group

The large islands of the Hawaiian group, with their great mountains, stupendous cliffs, and dizzy gorges, are sharply in contrast with the other islands of the chain. More numerous though they are, and scattered more widely in the sea, the lesser islands are merely rocks that thrust themselves above the waves—tiny beaches of sand hardly rising above the sea—coral atolls—reefs.

The Lava Rock Islets

Nihoa, or Bird Island, is by all odds the most spectacular of the lava rock islets. Not to be confused with Niihau, Nihoa Island stands alone in its waste of sea 130 miles northwest of Niihau and 300 from Honolulu. Abrupt, precipitous, and uninhabited, this rock rises almost directly from the sea to a height of 895 feet.

Its other name—Bird Island—tells most of its story,

for here, in endless cacophony, dwell tens of thousands of birds for whom, in order to protect them from the depredations of Japanese hunters, this island, together with all these lesser ones except Midway, was set aside in 1909 to make up the Hawaiian Islands Bird Reservation.

A hundred and eighty miles, or thereabouts, west and north of Nihoa lies Necker Island, a similar rocky upthrust with a summit 276 feet above the waves. Another 100 miles to the west and French Frigate Shoal—a single rock 120 feet high and sixteen sand islets—breaks the surface of the ocean. A hundred and twenty-five miles northwest of this shoal is Gardner Island, or the Gardner Pinnacles, which, as their name suggests, are little more than rocky columns, rising 170 feet above the waves.

These are the so-called “lava rock islands”—remains, according to geologists, of older islands which now, after aeons of struggle against the elements, are reduced to lonely, mid-sea tombstones that mark the spots where larger islands once stood.

The Islands of Coral and Sand

The coral islands, atolls, and sandspits that lie still farther west literally swarm with birds but all of them, except Midway, are otherwise uninhabited. Laysan Island is the first of these. Lying low in the sea some 250 miles to the west of Gardner Island and a little to the north, it is hardly more than a necklace of sand surrounding its mile-long inner lagoon.

A hundred and ten miles to the west of Laysan is Lisianski Island, a tiny sandbank surrounded by a reef.

A hundred and ninety miles to the northwest of Lisianski, and in strangely close company for seas so lonely, are Pearl Island and near-by Hermes Reef which, actually, is made up of a round dozen tiny sand islets.

And now, another 80 miles or so to the north of west,

and about 1,250 miles west-northwest of Honolulu, lies Midway.

In reality Midway is a coral atoll, with which are combined two low-lying sand islands—Sand Island and Eastern Island. The atoll is an irregular oval 5 to 6 miles in diameter which, for two thirds of its circumference, is made up of little coral islets, many of which are to be measured merely in yards, though some—in length but not in breadth—reach greater dimensions. One, in fact, is all of 2 miles long, but even at its widest point a fairly sturdy golfer might drive a golf ball from beach to beach. A full one third of the circumference of the atoll on its northwestern side is merely a coral reef that does not reach the surface, and upon this the seas forever break in a line of foam.

Within the coral oval the water is, for the most part, shallow and coral studded, but at the southern side, just within the edging of coral islets, lie the two considerable islands that really make up Midway. Sand Island is almost 2 miles long, and at its widest point—the northern end—measures a full mile. A mile and a quarter to the east lies Eastern Island—a triangle of sand with two sides each a little over a mile in length, while the third side—the eastern—measures three quarters of a mile. A little sand islet a couple of hundred yards or so in length, and half as wide, lies off the western point of Eastern Island.

Here, among the sand and grasses, among the low-lying sandy knolls, none of which rises more than forty feet above the sea, are installed whatever of military strength Midway has been given with which to guard this priceless bit of mid-Pacific sand and coral against the enemies of America.

Another 60 miles to the west lies smaller Kure Island which, also, is made up of two sandy islets. As if to add importance to its low and sandy insignificance, men have

variously christened this fragment of the earth's surface. Frequently it is called Ocean Island. And, for full measure, someone at some time called it Green Island, a name that even yet is sometimes used. Yet, for all its many names, this is the final grain of sand in the Hawaiian archipelago's attenuated chain. From Kure Island to Japan is about as great a distance as from Newfoundland to Ireland, and almost nothing lies between.

And nothing much more remains of the Hawaiians except little Johnston Island, 900 miles or so to the west and south of Honolulu. Important as a landing place for planes, it is little more than a line of surf and sand and coral.

In addition, interspersed at widely separated intervals in the sea between Kauai and Midway, five shoals and reefs and banks lie barely awash among the waves or actually fail, by a little, to reach the surface. Frost Shoal, Brooks Shoal, Maro Reef, Dowsett Reef, and Gambia Bank are not islands at all. Instead, they are merely hazards of the sea, upon which the pounding surf breaks into foam, and from which, if they are fortunate, ships stay clear.

Widespread though the Hawaiian Islands are, their greatest distances lie east and west, not north and south. Consequently there is less difference in climate among them than might otherwise be the case. Kure Island is the northernmost of the group and lies in about the same latitude as Tampa, Florida. Hawaii Island is the southernmost and extends about as far south as Puerto Rico. Thus one might expect a climate not greatly different from that of southern Florida and the more northerly of the West Indies. But, surrounded by thousands of miles of ocean on every side, Hawaii is cooler than other regions in the same latitude.

The sky is usually cloudless or only partly cloudy. The northeast trade winds blow with periodic variations from March to December, and the leeward coasts of the larger islands, being protected by high mountains, have regular land and sea breezes of their own. During January, February, and a part of March the wind is inclined to blow strongly from the south or southwest, and is sometimes unpleasantly hot and damp.

There is no distinct rainy or dry season, but far more rain falls on the windward sides of the large, high islands than on the protected leeward sides. Furthermore, on the windward slopes the amount of rain tends to increase with the elevation up to four or five thousand feet. Here and there, too, amazing differences have been recorded within very short distances. For instance, on the island of Maui, rainfall of only 2.46 inches was recorded one year on the low, mid-island isthmus while, the same year, 562 inches fell at a 5,000-foot elevation only $8\frac{1}{2}$ miles away. These, incidentally, are said to be the lowest and highest of all official records in the group.

Temperatures are moderate, and at Honolulu the mean annual temperature is about 75 degrees, with a maximum of 88 and a minimum of 56. Altogether, the climate is equable, with abundant sunshine, and with a notable absence of tropical storms.

The mineral wealth of the Hawaiian group is inconsiderable, but the soil of the major islands has been made almost entirely of decomposed lava, and is especially rich in nitrogen. On the windward heights it is likely to be thin and poor. At lower levels on the leeward sides it usually is very fertile but frequently does not hold moisture well. It is principally in the older valleys where great fertility and an ability to hold moisture are combined. In the valleys of Maui, Oahu, and Kauai, and in certain low-

lying sections of Molokai the soil is deep, rich, and moisture-retaining. Agriculturally, these are the most productive regions of the archipelago.

Owing to their isolation, the Hawaiian Islands have a peculiar native flora. On account of the great elevation of the mountains, with the varying temperatures, humidity, and barometric pressure that result, an unusually large number of species is found. Within the past century and a half, of course, hundreds of plants have been introduced, but even yet Hawaii is an interesting field for the botanist because of the hundreds of species peculiar to this part of the Pacific.

Hawaiian forests are definitely tropical, and vines are common, but the trees are not remarkable for their height. Forests are usually located at elevations of 2,000 to 8,000 feet. Only a few native species of trees grow well below 2,000 feet, and above 8,000 their growth is stunted or is impossible. In regions of heavy rainfall the forests, with their undergrowth of ferns and climbing vines, are especially dense and difficult to traverse. A tree called the ohia-lehua (*Metrosideros polymorpha*) is one of the commonest and is widely used for firewood. A tree called the koa (*Acacia koa*) is the only one on the islands that furnishes much valuable lumber, but its wood is excellent for cabinetwork and is sometimes called "Hawaiian mahogany." The natives formerly made the hulls of their canoes of koa trees, which are to be found in extensive forests on Hawaii and Maui. Sandalwood is still to be found here and there, but the heavy trade in this fragrant wood during the early part of the nineteenth century went far toward eliminating it. The kela tree has a wood that resembles ebony. The natives' idols were formerly made of halapepe wood, because, being soft, it is readily carved. A tree called the wiliwili supplies a wood as light as cork but much stronger, and the outriggers of the native canoes

are usually made of it. Rubber and coffee trees have been introduced, but do not play major parts in the islands' production.

Hawaii is remarkably poor in indigenous fruit-bearing plants, but an extraordinary number that have been introduced thrive on the islands now. Oranges, pineapples, bananas, coconuts, grapes, mangoes, guavas, and many other tropical, subtropical, and temperate zone fruits are grown.

Most of the native grasses have little value for grazing. One of these—hilo grass—covers the ground so densely as to prevent the spread of forests. Pili grass is very troublesome, for its "bristles"—not unlike the "beard" of barley and wheat—get badly snarled in the wool of sheep. On the island of Niihau there is a species of grass of which the natives formerly made beautiful mats, and which is sometimes used to make "Panama" hats.

Ferns of many varieties are numerous, and they are to be found in every size, from the smallest to some thirty feet high. Sugar cane, the production of which is the most important industry in the islands, was introduced before the discovery of the group by Captain Cook.

Contrasting with the great islands, the lesser islands to the west and north have little vegetation save coarse grasses and minor shrubs.

Rich in native flora though the islands are, they were strangely poor in mammalian life prior to the coming of men. The natives themselves were responsible for the introduction, prior to the arrival of Cook, of hogs, dogs, and rats. Before the arrival of these animals there seem to have been almost no mammals whatever, except for day-flying bats and, naturally, whales and certain of their marine cousins. Even reptiles are rare, the only ones on the islands being a few species of skinks and geckos, while snakes are unknown.

Insects are numerous, and many Hawaiian species are unknown elsewhere. Cockroaches, locusts, and mosquitoes are uncomfortably prolific, and wasps, scorpions, and centipedes are common. Most of these, however, have been introduced from other lands.

Hawaiian waters are productive of many fish, which have always played an important part in the diet of Hawaiians, but the most remarkable division of Hawaiian animal life is that which makes up the crowded population of the "bird islands." Collectively, these little islands, which make up the Hawaiian Islands Bird Reservation, form the largest and most numerous bird colony in the world. It has been estimated that the tiny island of Laysan alone supports resident and migratory birds to a total of about ten million in a single year.

Here, and on the other bird islands (as well as on Midway) are endless noisy flocks of frigate birds, man-of-war birds, tropic, mutton, and miller birds. In constant raucous convention there are Laysan canaries, finches, ducks, and honey eaters. Terns, curlews, turnstones, stilts, plover, and shovelers abound. Boobies, tattlers, and petrels are everywhere. There are sheerwaters which, rabbitlike, burrow in the ground. There are rails which cannot fly because of their rudimentary wings. And in large numbers, there are albatrosses, which occasionally may be seen dancing solemnly but most ludicrously, two by two. Most of these millions of birds seem utterly unafraid of man.

The aboriginal Hawaiians belong to the Malayo-Polynesian race. Their skin is reddish brown, their hair either dark brown or black, and often it is wavy or even curly. Their faces are broad, their noses somewhat flattened, their lips thick, and their eyes large and expressive. Most of the people have always been of moderate stature, but the "nobility"—the chiefs, that is, and their families—have been remarkable for their height, and 400 pounds was, at

the time of Cook, and even later, not an unusual weight for a man of this class. Yet, despite this tendency to corpulence, the chiefs were definitely superior in physique to the common people. This fact does not confirm our belief in the bad effects of inbreeding, for among the upper classes marriage was almost exclusively confined to close relatives.

At the time of Cook's visit to the islands the population was thoroughly homogeneous, and is thought to have numbered about 300,000, though Cook's own estimate was higher. Contact with Europeans, however, brought in new diseases against which Hawaiians had built up no immunity. Consequently, the death rate increased sharply and a census taken in 1832 showed only 130,313 people on the islands.

By 1872 the population had dropped to 56,897, of whom about 5,000 were foreign, but about this time immigration began to reverse the trend. People came from the United States, from Japan, China, and elsewhere. By 1900 the population had reached 154,001, though only 29,834 of these were Hawaiians.

It was during this period that the extraordinary intermixing of the races began. Today, because of this, Hawaii offers the ethnologist a field of study almost unparalleled in the world.

It seems highly probable that the scattered islands of the Pacific were the last habitable regions on earth to be occupied by man. The peoples of most of the Pacific islands are racially intermixed, and that was certainly true even of the early Hawaiians. Apparently they came to Hawaii from, or by way of, Samoa about 500 A. D., and for the next five centuries lived in seclusion and peace. During the eleventh, twelfth, and thirteenth centuries intercourse was resumed with Tahiti, Samoa, and other islands by means of huge sailing canoes, and during this

period tribal taboos became complicated and severe, and human sacrifices increased.

Then followed another long period of isolation during which there were more or less continuous wars of rebellion. In the course of time a kind of feudal system was developed, with the families of the chiefs holding themselves aloof from the common people. The chiefs, too, were not only physically superior to their subjects, but were also mentally much more able.

Both polygamy and polyandry were practiced, especially by the chiefs, and rank descended mostly through the mother.

The language of the Hawaiians resembles that of the people of the Marquesas, and is obviously related to other languages of the South Seas. It is soft and musical, with vowels and liquids predominating. Insofar as Hawaiian sounds can be represented by our alphabet, the only consonants are *k*, *l*, *m*, *n*, and *p* which, with a gentle sort of *b* and a sound best—though perhaps inadequately—represented by *w*, make up, with the five vowels, the letters in use. While *r* and *t* have frequently been used in attempting to spell certain Hawaiian words, *l* and *k* are probably closer to reality. For instance, the word "taro"—the name of an important edible root—may be more accurately presented when spelled "kalo."

Prior to the coming of the white man the Hawaiians had no written language, though they were fond of oratory, poetry, history, storytelling, chants, and riddles. Because of this interest in the spoken word, they paid close attention to proper pronunciation. In lieu of writing they preserved their knowledge by teaching certain specialists whose business it was to remember.

The typical native house is built of wood, and thatched. Its floor is of stone covered with mats. Food is cooked in holes in the ground, heat being introduced by means of

hot stones. Many foods, including certain fish, are eaten raw.

Skillful navigators, the Hawaiians have, for centuries, built double and single outrigger canoes, the largest of which have been ninety or even a hundred feet in length. The warriors used spears and javelins, clubs and slings, but carried no shields and did not use bows and arrows, though bows and arrows were known to them. They have always been athletic, and are noted for their prowess at swimming, surf boarding, wrestling, and foot racing. Gambling among them was once common, and they made both fermented and narcotic drinks, but not distilled liquors.

Fond of music, both vocal and instrumental, they developed percussion, string, and wind instruments. One of the most interesting of these is a nose flute. The ukelele, though popularized by Hawaiians, was of Portuguese origin.

As a race, they are fond of dancing and have developed many forms, of which, perhaps, the notorious "hula" formerly was among the most common. Their love of flowers is widely known, and their use of "leis" (necklaces) made of flowers is widespread even yet.

The old Hawaiian religion was based on four main gods—Kane, Kanaloa, Ku, and Lono—and a host of lesser gods. Animals, plants, places, occupations, families, objects, and forces all had their gods and spirits, of which they made wooden idols and which they worshiped in temples built of stone.

Priests and sorcerers were influential. There were places of refuge to which any person in danger—even in time of war—could flee and in which he would be safe. Certain cannibalistic religious rites were followed, though real cannibalism was unknown. Infanticide, however, was widely practiced, and many taboos were extreme. For instance, up to the time when taboos were eliminated by

royal decree in 1820, women were put to death if they ate bananas, pork, turtle, certain fish, or even coconuts.

Discovered by Captain James Cook in 1778, the islands were named by him for the Earl of Sandwich, and for many years were called the Sandwich Islands. It seems apparent, however, that they had been discovered much earlier by the Spaniards. But so infrequently were European ships to be found in mid-Pacific before the end of the eighteenth century that their earlier discovery served no useful purpose.

Before the discovery of the group by Cook the islands were divided into three distinct kingdoms. The island of Hawaii formed one; Oahu and Maui was a second; and Lanai and Molokai a third. Shortly after Cook's visit, however, a chief named Kamehameha came to power on Hawaii. Undoubtedly far more able than any other chief, he set about unifying the group under his rule.

He built ships on European models. He imported firearms. He created an enthusiastic army, and, by 1795, had become undisputed master of the entire group. He employed two Americans (John Young and Isaac Davis) as his advisers, encouraged trade, and, upon his death in 1819, was succeeded by his son.

During the succeeding eighty years many governmental changes were introduced—not invariably with success—and at least two attempts were made by foreigners to seize the islands (one by France in 1839, and one, in 1843, by a British naval officer whose action was promptly disavowed by London). In 1887 a revolt was precipitated when the king—Kalakau—accepted two bribes for the assignment of an opium license. Five years later Kalakau died and was succeeded by his sister, Liliuokalani, who, in turn, was promptly deposed by revolt and was succeeded by a provisional government which proposed union with the United States. And finally, on August 12, 1898, the American

flag was officially raised over the Executive Building.

Except for the island of Midway and certain other island fragments formerly thought to be hardly worthy of official attention, all the Hawaiian Islands became a possession of the United States at that time. Midway, however, was acquired by the United States in 1859, and has been a cable station since 1902. More recently, too, it became a "division point" on the airplane route to the Orient.

Hawaii is now considered to be an integral part of the United States. It is a territory governed under an Organic Act that became effective June 14, 1900. The territory has a delegate in the United States House of Representatives, and this delegate, who is elected for a two-year term, may introduce measures but may not vote.

The President of the United States appoints the governor and secretary of Hawaii, and the appointees must be approved by the U. S. Senate.

The territorial legislature meets biennially, and is made up of a Senate of fifteen members, and a House of Representatives of thirty members.

Since coming under the American flag the islands have been developed to an ever greater extent by the growing white population, and they now form a thoroughly modern community. The agricultural workers are, to a large extent, Japanese and Chinese. The former have intermarried with other races far less than have the Chinese, and form the largest bloc on the islands. The islands' major enterprises are owned and controlled by American citizens, and the original natives of the islands now form a very small part of the total population.

The great decrease in their numbers naturally troubles the native Hawaiians. Pleasant and friendly though they naturally are, the fact that they are rapidly becoming a smaller and smaller part of the population of the islands which once were exclusively their own has not been easy

to accept. And when, added to this, more than a few of the newcomers have been very much less considerate than they might have been, it is not unnatural that friction has resulted. In fact, it says much for the pure-blooded Hawaiians that there has not been more.

On the other hand, the influx of white men and the investment of money from "the mainland" has made possible the economic improvement of the islands. Where, formerly, they were hardly more than in a state of nature, now they are thoroughly developed. Equipped with excellent roads, with more than a thousand miles of railroads (of which about two thirds are on the great sugar plantations), and with good interisland ships, the communications system of the group is the best in all the mid-Pacific. There are twenty-six cities and towns of over 1,000 population, of which Honolulu (200,158), on Oahu, is first; Hilo (22,667), on Hawaii, second; and Wailuku (7,315), on Maui, third.

Strategic Importance

The Hawaiian Islands are the very crossroads of the mid-Pacific, as the following table demonstrates:

Distances from Honolulu

To Los Angeles	2,228 miles
To San Francisco	2,089 miles
To Seattle	2,409 miles
To Sitka, Alaska	2,395 miles
To Unalaska	2,106 miles
To Yokohama	3,394 miles
To Guam	3,337 miles
To Sydney, Australia	4,420 miles
To Auckland, N. Z.	3,763 miles
To Samoa	2,263 miles
To Tahiti	2,390 miles

Unlike the many islands of the South Pacific, the Hawaiian group has no close neighbors. In addition, they far surpass in size and in population any islands that lie at a distance from the continental mainlands of Asia, Australia, and America.

Here, with great naval and air bases at its disposal, the United States has the key to the Pacific. With Hawaii in our hands, control of the Pacific can hardly be attained by any other nation. So long as we hold it, equip it properly, and defend it determinedly, our West Coast is guarded. In conjunction with a thoroughly defended series of bases in the Aleutians, Hawaii is the vastly important spring-board from which our power can be launched against any Pacific enemy, and is, at the same time, the mid-sea fortress that protects our West Coast from serious attack.

This island group, from the point of view of the safety of America, stands, by all odds, first.

CHAPTER TWO

The Marquesas and the Tuamotu Archipelago

TWO THOUSAND MILES southeast by south of Honolulu lie the Marquesas Islands, a possession of France and one of the two easternmost outposts of the island world of the South Pacific. Ten to 20 degrees south of the equator, about 140 degrees west of Greenwich, and 3,600 miles off the coast of South America, the Marquesas and the near-by Tuamotu Archipelago are far removed from the major sea routes of this portion of the world, and play a minor part in the affairs of the Pacific.

Rising abruptly from the sea to considerable heights, the eight major islands of the Marquesas, with their many inlets, their deep valleys, their frowning cliffs, and heavy tropical forests, are among the most beautiful of the islands of the Pacific. In addition to the eight principal islands there are half-a-dozen lesser rocks and coral islets, and the total area of the group is 490 square miles. Thus the entire group does not quite equal in area the single Hawaiian island of Oahu. Volcanic in origin and luxuriant in vegetation, the islands are unusually fertile and formerly supported a large population. Now, however, fewer than 2,500 people are to be found there.

Forming an irregular pattern and extending for 235 miles from northwest to southeast, the islands lie in three clusters, the most southeastern of which is the most numerous.

Hiva Oa Island and Its Neighbors

Hiva Oa, one of the southeastern cluster, is the second largest of the Marquesas and is the administrative center of the group. It is 23 miles long by half that in width, with a coast line of about 60 miles. Its eastern end narrows until it is hardly more than a slender point, but its western end is broad, high, and cliff-lined. A high central ridge runs lengthwise of the island, and into both sides of this ridge are cut many deep and heavily forested valleys. These valleys, because their coastal ends so often form bays, are themselves called "bays." A considerable portion of the island, however, is made up of an irregular plateau 1,000 feet or so above the level of the sea, from which forest-clad Mt. Temetiu rises to an elevation of 4,130 feet.

Most of the island—and especially the plateau—is fertile and well watered. Almost any tropical or subtropical plant could be grown there, but for the most part the island is uncultivated and it produces very little.

The office and bungalow of the French administrator of the Marquesas is situated in the little village of Atuona, which lies on the southern coast of Hiva Oa. A miniature town of only a few score bungalows and native houses, Atuona is picturesquely situated at the mouth of one of the island's most beautiful valleys, and looks out over the Bay of Traitors, with Mt. Temetiu towering behind. It has very little trade, and what there is is carried on by means of a few irregular trading schooners and an occasional, rare steamship that appear at infrequent intervals at the near-by anchorage of Taha-uka. Copra—the dried meat of coconuts—is the principal product of the islands, and a little cotton and sugar cane is grown. The population of the whole island does not greatly exceed 1,000.

Tahuata, a small but beautiful island 6 miles in length by 3 in breadth lies across a 3-mile channel to the south of

Hiva Oa's western end. Once heavily populated, it is now, despite its beauty and fertility, deserted. Moho-tani, a somewhat lesser island, lies about 11 miles south of Hiva Oa's eastern end. It, too, is deserted, but 25 miles farther south the island of Fatu Hiva supports a population of about 300. Only 8 miles in length by 4 in breadth, Fatu Hiva, a century ago, was the headquarters for the French administrator, but its rich, secluded valleys now support only a handful of people, though in the days of the whaling ships, when many craft from New Bedford and Nantucket anchored in its safe harbors of Oomoa and Hanavave, the island was populated by thousands of friendly natives.

All three of these islands are smaller counterparts of Hiva Oa—in appearance as well as in vegetation—and they, together with the fragmentary and uninhabited island of Fatu Huku, which lies 15 miles north of Hiva Oa, complete this southernmost cluster of the Marquesas.

Nokuhiva, Ua Pau, and Ua Huka

The three islands of Nokuhiva, Ua Pau, and Ua Huka make up the central cluster of the Marquesas. Nokuhiva, about 65 miles to the northwest of Hiva Oa, is the largest island of the entire group, though its measurements exceed those of Hiva Oa by very little. It is somewhat shorter but noticeably broader than Hiva Oa, and its coast line measures 70 miles while that of Hiva Oa is about 60. Its central peak, too, is almost the same height as the one on Hiva Oa and reaches an elevation of 3,888 feet.

In fact, except for details, Nokuhiva is the twin of Hiva Oa. The coastal cliffs, the central ridge, and the heavily forested slopes and valleys are the same. The principal difference lies in the fact that the population of Nokuhiva is slightly smaller.

Anaho Bay, on the northern coast, is one of the most important of the island's harbors, and a palm-shaded native

village looks out across it from behind a curve of beach. On the whole island there are almost no representatives of the French—only a gendarme and a trader or two.

Twenty-five miles south of Nokuhiva is the much smaller island of Ua Pau with its 4,040 foot peak, and some 30 miles east of Nokuhiva lies Ua Huka. Both of these are small, each being about 7 miles in length, and each is ridged and rugged, though Ua Huka's greatest elevation is hardly more than half of that of Ua Pau's.

Productive of very little besides their luxuriant forests, these two islands support only a handful of people. The population of Ua Pau is about 100, while Ua Huka has fewer still.

Elao and Ha-tutu

Northwest by north of Nokuhiva, across a 56-mile channel, lie the northernmost islands of the group. Elao, which is $6\frac{1}{2}$ miles long, has a central ridge which reaches a height of about 2,000 feet. Heavily covered with vegetation, it was formerly used by the French as a place of exile for certain convicts of the Society Islands, but now is deserted.

About 10 miles to the northeast of Elao is lesser Ha-tutu Island. Four miles long, about 1 mile in width, and no longer inhabited, Ha-tutu, except for a sandbank a few hundred yards in extent, is the most northerly of the Marquesas group.

The climate of the Marquesas, though hot and humid, is not unhealthful. The islands lie in the path of moderate winds that blow, most of the year, from the east, and the larger islands also often have both land and sea breezes. At the end of November the rainy season begins and lasts for about six months, during which the temperature varies

from about 80-90 degrees. During the dry season the average temperatures are about 5 degrees less. At long intervals there may be droughts so serious as to threaten most of the vegetation.

Vegetation is luxuriant almost everywhere, but is especially rich in the well-watered valleys. The flora includes more than four hundred known species, many of which are the same as are to be found on certain of the more elevated islands to the south and west. The vegetable products include coconut and other palms, bananas, breadfruit, bamboo, sugar cane, wild cotton, plantains, yams, and several kinds of trees that produce timber, but the population is now so small that few of these products are of commercial value. On some of the islands the forests are so dense that it is difficult to force a way through them.

The land fauna is remarkably poor. There are few animals besides dogs, rats, and pigs, though cattle and asses that were formerly domestic are now to be found wild on all the larger islands. Insects are few, and though bird life is abundant few species are represented. Of twenty species known more than half are aquatic. The great abundance of fish no doubt explains the presence of great swarms of large sharks off Elao and the other northern islands.

The native Marquesans are Polynesians, but have frequently been said to be physically the finest of all South Sea Islanders. They reached the Marquesas about 200 A. D., or somewhat later, apparently by way of Samoa, and so are related to most of the other natives of this portion of the world. Bronze in color, they somewhat resemble the Hawaiians, though the extent to which they tattooed themselves formerly tended to hide that fact.

In their native state they were cannibals, and because

no rituals or other religious rites accompanied the consumption of human flesh it has been suggested that it was indulged in merely as a matter of taste.

They have always raised large numbers of pigs and chickens, but their vegetable needs called for little labor. Coconuts, breadfruit, yams, and other such foods are to be found wild and need merely to be collected.

Their houses, to which water is often led through pipes made of bamboo, are of wood and are thatched, but they are erected on stone platforms. These platforms, which are four to eight feet high and two or three times the area of the house, serve also as "porches" or "courtyards." Thousands of them, with the houses long since decayed and gone, are to be found in every part of each of the large islands, showing plainly that the population was once far greater than it is now.

Larger stone platforms appear to have been the dwelling places of priests, and large "amphitheatres" of unique construction are still to be found. One of these, near the village of Tai-o-hae, on Nokuhiva, measures 300 feet by 80 feet. A strip of level ground is enclosed by a stone platform a few feet high and about 20 feet in width. This was the "grandstand" and on it a number of higher platforms were built, apparently for the use of chiefs. Within the enclosure altars were built; here sacrifices were offered and various public events were held. The sacrifices to the gods were usually pigs, and human sacrifice was apparently unknown.

Competent seamen, the people of the Marquesas build outrigger canoes and often voyage long distances. They were formerly bloodthirsty and warlike, but at the same time showed many friendly, hospitable traits. Their simple political system revolved almost entirely about their chiefs, though their priests were influential.

Among the most savage of the Polynesians, the Marque-

sans' family life has always been simple, though debauchery, at least formerly, was universal, and infanticide was an organized institution. In a strange way they intermixed friendliness and generosity with fierceness and bloodthirstiness. Their religion was based on an infinity of gods and spirits, and the island of Fatu Huku was formerly sacred to Tana-*oa*, the important god of fishermen.

Originally discovered in 1595 by Alvaro Mendaña who, however, came across only the southern cluster of islands, the group was rediscovered by Russians, French, British, and Americans over a period of two hundred years. Thus every island has two or more names. The name of the archipelago is a contraction of the original name given the islands by Mendaña, who chose thus to honor the wife of the viceroy of Peru—*Las Islas Marquesas de Mendoza*.

Even up to the days of the whaling ships in the first half of the nineteenth century the population of the Marquesas was heavy. Estimates vary, but 100,000 to 160,000 people must formerly have dwelt on these islands. Almost utterly without diseases of their own, they had built up no immunities against those of the white man. Thus when smallpox and syphilis came to the islands on a ship from Peru, and when tuberculosis was introduced from some other source, the formerly disease-free Marquesans began to die in tragic numbers. The introduction of opium and liquor merely added to the tragedy.

In 1842 the French seized the islands and, after a long and costly struggle, abandoned them, in 1859. Later, however, they returned, put down the natives once more, and settled themselves permanently. The islands are now a part of the dependency of Tahiti.

Primarily because of disease, the formerly numerous Marquesans are now no more than the merest remnant of their former selves—a remnant, too, that still is growing

smaller. As yet there is no sign that the remaining twenty-five hundred of the "finest physical specimens of the South Seas" will be able to prevent their actual extinction. Furthermore, nothing in the way of colonization has so far suggested that the naturally rich Marquesas Islands may again become populous and productive.

In all the Pacific no blacker mark stands to the discredit of the white man.

The Tuamotu Archipelago
Sometimes called the Paumotu Archipelago, the
Low Archipelago, the Dangerous Archipelago, or
The Pearl Islands

Less than three hundred miles south of the Marquesas, and stretching in a broad path for 1,300 miles from west-northwest to east-southeast, are the 78 low-lying coral atolls and islets that make up the Tuamotu Archipelago.

Far off at the eastern end of these lie the so-called Gambier Islands. The four small islands in this cluster, which are surrounded by a scattering of inconsequential rocks, are volcanic in origin, but all the others in the extended Tuamotu group are of coral, and even the Gambier Islands are partly surrounded by a wide coral reef. Stretching from 130 degrees west longitude to 150 degrees, and from 13 degrees south latitude to 23 degrees south, the Tuamotu Archipelago, despite its many islands and the great area over which they are scattered, has the remarkably small total area of roughly 330 square miles. The population, too, is small, being estimated at 4,500, among whom there are a few hundred Asiatics and only a dozen or so white men.

So similar in appearance and formation are these islands (save for the Gambier cluster) that it is difficult to differentiate between them. There are few landmarks of any note, and the trading schooners of those seas must navigate

accurately in order to make their chosen landfalls. Here and there—to a total of eighteen or twenty—the islands are extensive atolls surrounding large lagoons. Elsewhere they are mere coral reefs which, insofar as they emerge from the water, are small, low, and of a variety of shapes. Some are crescent-shaped with submerged reefs forming the remainder of the circle. Some are merely narrow islands or groups of islets that rise to the surface in irregular patterns.

Universally, however (always excepting the Gambiers), they are low—so low, in fact, that many of them are sometimes swept from beach to beach by the waves of hurricanes; and throughout the group, during the “hurricane season,” which lasts from November to March, the southwesterly swells that run so heavily at that time create really dangerous conditions where they pound furiously on the western and southern coasts of these widely scattered islands.

Fakarava, which is 200 miles from the western end of the group, is next to the largest and one of the most important islands. It is an atoll, oval in shape, 32 miles from northwest to southeast, and 10 miles wide. But these dimensions do not give an accurate idea of the island's size, for dry land is to be found only where fifteen narrow islets of varying lengths form the circumference of this extended oval. Even where the village of Rotoava houses its population of about 100 among its pandanus trees and coconut palms, only some 400 yards of coral and sand and soil separate the sea beach from the quieter beach of the lagoon. Nor is Rotoava one of the archipelago's lesser towns. Formerly it was the headquarters of the French administrator of the islands, and is an attractive village laid out along a broad avenue that is bordered by pleasant bungalows, and curving palms. Its poste de police, which is in miniature, is usually pasted over with handbills and

public notices printed in French and in Tahitian. A Catholic chapel with a belfry stands at one end of the village.

The similar atoll of Apataki, 60 or 70 miles northwest of Fakarava, is now the administrative headquarters of the group. Its lagoon is 18 miles in length by 15 in width, and two of the waterways that separate the islets of which the atoll is made form passages through which ships may enter the waters of the lagoon. Pakaka Passage, at the southwestern end, is frequently used by trading schooners, though Tehere Passage, on the northwest side, is the only one that is practical for larger vessels.

Rangiroa, within 75 miles of the western end of the archipelago, is the largest atoll of the group. It is made up of twenty islets which surround a palm-fringed lagoon 45 miles in length and 15 in width, within which is one of the group's best harbors. The atoll of Hao, which is near the center of the group, has fifty islets about its lagoon, but the lagoon itself is so studded with coral as to be dangerous to all but local boatmen.

About 40 miles south of Fakarava the atoll of Anaa has its eleven islets so regularly spaced about its lagoon that Captain Cook, who visited the archipelago in 1769, preferred to call it Chain Island. Tikehau is a large circular atoll just west of Rangiroa. Kaukura, Toau, Anatica, Kauci, Raraka, and Raefski are large atolls which lie within 50 miles of Fakarava. Makemo, Nihiru, and Marutea lie close together 125 miles east of Fakarava, and Hao Island (called Bow Island by Captain Cook) surrounds its oval lagoon very close to the center of the archipelago. The best pearl-fishing lagoons are those of Takume, Takaroa, Tata-poto, Makemo, Manihi, Arutua, Raroia, Kaukura, Marokau, Hao, and Apataki.

Most of the largest atolls lie in two irregular lines in the westernmost third of the archipelago. Elsewhere, though here and there an atoll of real size is to be found, the islands

and reefs are smaller. Many are so small and low as to be unfit for habitation. Others, not having been hurricane-swept for many years, support small populations which, however, may be called upon to face disaster when some unusually severe hurricane sweeps across their beaches.

In sharp contrast to these coral islands, few of which reach an elevation of more than 15 or 20 feet, the Gambier Islands, far at the archipelago's southeastern end, stand boldly above the sea. Even of the four largest islets only one—Mangareva—is of any importance. It is 5 miles in length, rises to an elevation of 1,315 feet, and is covered heavily with vegetation that is suggestive of the Marquesas, as are its three close neighbors, the smaller islands of Au-kena, Aka-maru, and Motu-ari. The other lesser islets lie, with the larger ones, in a circle 11 miles in diameter, outside of which, on the north and east, lies the reef. The smallest islets range in size from barren rocks to a few acres of rock and soil whereon a few plants have found a footing and on which sea birds rest.

The climate of the Tuamotus is healthful with no extremes of temperature. Occasionally the thermometer drops into the sixties, and frequently mounts into the eighties. Rarely, however, does it exceed these limits. Easterly trade winds prevail, and rain and fog appear occasionally even in the dry season. The most extreme characteristic of the weather has to do with the hurricanes which, at irregular intervals, sweep with furious force across the islands between November and March. Now and again, especially on the lower atolls and islands, these storms destroy habitations, tear down trees, drown whole villages, and even change the shape of islands.

Neither plants nor animals are well represented on the islands. In fact, coral islands generally are poor in plant life. Coconut palms, pandanus, breadfruit, bananas, pine-

apples, yams, and melons grow on many islands, though some are all but barren and others have little but a few coconut palms.

Native mammals hardly exist and seem to be confined to a few rats. Dogs and pigs have been introduced, but almost no other mammals are to be seen. Sea birds are numerous, and parakeets, doves, and thrushes are fairly common. There are very few insects, and there are no reptiles aside from a few lizards.

The sea and the lagoons are filled with life. Turtles, fish of hundreds of species, and shellfish abound. Coral, of which the islands are predominantly made, is everywhere, and great beds of pearl oysters are so common that the archipelago is sometimes called the Pearl Islands.

The people of the islands are sturdy Polynesians, slightly darker in color than those on the island of Tahiti in the near-by Society Islands, whom they otherwise closely resemble. In the western portions of the archipelago, however, they have intermixed considerably with other races. The few islanders who live on the higher and rockier Gambier Islands closely resemble, in physique, language, religion, and customs, the people of the Cook Islands which lie 1,600 miles to the west. The Tuamotans are unique only in their ability as divers on the pearling beds. Here, without diving suits, they regularly go down many fathoms, sometimes as many as 18 or 19, and fearlessly face the dangers from sharks. They bring up not only considerable catches of pearl shell, but many of the world's finest pearls.

Pedro Fernandez de Quiros, a Spaniard, discovered a few of these islands in 1606, but more than two hundred years elapsed before they had all been discovered. Because of the difficulty of distinguishing between them and because so many "discoveries" were merely recorded in old logbooks, many of the islands have two or more names, though, for the most part, the native names are utilized.

France, in 1844, two years after seizing the Marquesas, took control of the Tuamotus, and her claim has never been questioned. The islands were, in the language of diplomacy, merely "under the protection" of the French until 1881, but at that time they were frankly annexed, and now form a part of the dependency of Tahiti. Because of the trifling population, the limited resources, and the inconsiderable strategic value of these scattered islands, it is unlikely, as the world is constituted today, that French control will be seriously challenged.

CHAPTER THREE

The Society Islands, Tubuai Islands, Pitcairn, and Easter

THE "FRENCH ESTABLISHMENT OF OCEANIA," which includes the Marquesas and the Tuamotus, also takes in two other archipelagoes—the Society Islands and the lesser Tubuai, or Austral group. Tahiti, the most important island of the Society chain, lies 200 miles south and a little west of the most westerly of the Tuamotus, and Rurutu, the closest of the Tubuai Islands, lies another 330 miles south by west. Except for Tahiti, there is no island of considerable dimensions in either group, though some of them have striking characteristics despite their limited size.

The Society group is made up of fourteen scattered islands lying in an irregular chain that extends from east-southeast to west-northwest for 450 miles, but only eight are inhabited, and one or two even of these are unimportant. In the order of their size the inhabited islands are Tahiti, Raiatea, Moorea, Tahao, Huahine, Bora Bora, Maupiti, and Tubuai Manu. The tiny uninhabited islands are Mehetia, Tetiaroa, Motu Iti (or Tupai), Mopiha, Scilly, and Billingshausen, of which all but Mehetia are coral atolls.

Except for the coral atolls, the islands of the group are volcanic in origin. Mountains with steep peaks form their centers, and the surrounding lowlands are rich and productive. Even the steep mountains, except for a few stony cliffs, are densely covered with forest. There are many streams and after periods of exceptional rain magnificent

waterfalls leap from the steep cliffs. Most of the islands are surrounded by luxuriant coral reefs, within which the many good harbors of the archipelago usually lie, and it is generally conceded that this group is unsurpassed in beauty in all the Pacific.

The Island of Tahiti

Except for the uninhabited little island of Mehetia, Tahiti is the easternmost of the Society Islands. Largest of the group, and with a population greater than that of all the other islands combined, it lies $17\frac{1}{2}$ degrees south of the equator, and $149\frac{1}{2}$ degrees west of Greenwich. It is the most important island in all this portion of the Pacific.

Approximately 450 square miles in area and shaped much like the figure 8, Tahiti's narrow mid-island isthmus is only about a mile wide and does not reach an elevation of more than 50 feet; but each of the island's two rounded portions, the northwestern of which is about 20 miles in diameter, while the more oval southeastern is about 9 by 16, has tall and jagged central peaks of striking beauty and proportions. In the interior of Tahiti-nui (the larger section of the figure 8) the steep and forest-clad double peak of Mt. Orohena rises 7,349 feet, and Mt. Aorai, some two miles away, is about 600 feet lower. On Tahiti-iti (the lesser section of the island) Mt. Roniu reaches an elevation of 4,341 feet.

The interiors of both sections of the island are an uninhabited, trackless region of jagged peaks, precipitous gorges, rapid streams, and dense tropical forest, but between the central elevations and the shore there is a belt of alluvial soil that is remarkably fertile. Near the shore on this richly productive belt, straggling villages follow one another closely all about the island, and not far offshore, except along the island's northeast coast, a coral reef throws up its protection for the lagoon it forms.

On the northwest coast of the island, where a channel through the coral reef provides an entrance to the harbor, lies the modern little city of Papeete. It is a rambling collection of bungalows which are set so deep amid the tropical verdure that only the church spires and the larger buildings are much in evidence. Almost every house is covered with vines and flowers, which festoon the wide verandahs and run riot in the somewhat unkempt gardens. Only along the water front and in the main streets near the market place is there much resemblance to a real town, but here there are the shops, stores, hotels, and clubs of a modern, but definitely French, town, with a population of about 8,500.

Papeete is the capital of French Oceania and is the economic center as well. The small trading schooners that call at the islands of these widespread archipelagoes usually call Papeete their home port, and many of them are always tied up with their white hulls lying stern to the quay. Steamships which sail for America and Europe by way of Panama Canal carry on most of the export trade and bear away the copra, pearl shell, vanilla, phosphate rock, and lesser products of the islands to the markets of the world.

The island of Tahiti produces many tropical fruits and vegetables, among the most useful of which are bananas, oranges, melons, mangoes, avocado pears, limes, and guavas. Potatoes will not grow and must be imported. Cattle, pigs, chickens, ducks, and turkeys are raised successfully, and fish of scores of species are plentiful.

The Society Islands are divided by a wide channel into two clusters—the Windward, or eastern, and the Leeward, or western, groups. Tahiti is one of the four Windward islands, but only one other of any importance—Moorea—lies in this cluster. Mehetia, a small uninhabited volcanic island, less than 1 square mile in area, lies 60 miles east of

Tahiti, and Tetiaroa, a small uninhabited coral atoll made up of thirteen tiny islets that total about 1,600 acres, lies 30 miles to the north.

Moorea, which lies 12 miles west of Papeete, is an island about 50 square miles in area, is roughly triangular with rounded angles, and has two deep indentations on its northern coast. Reef-surrounded and with central peaks that reach an elevation of 3,976 feet, Moorea is, in general appearance, a lesser Tahiti. Its steep, densely forested central slopes and its rich coastal area are much the same as those of the larger island, and its products are the same. There are a number of villages about its shore, but all of them are small. The total population is about 2,250, of whom about 100 are Chinese, and a few more than that are white.

The Leeward Group, or Les Isles Sous le Vent

The island of Maiao, or Tubuai Manu, 45 miles west of Moorea, and 60 miles from Papeete, is the closest of the Leeward Group to Tahiti, but it is small, limited in population, and unimportant. Supporting about a hundred people, it is approximately 3 square miles in area, grows a few coconuts, and is the habitat of certain large edible crabs that are popular in the markets and restaurants of Papeete.

Huahine, which is 90 miles west-northwest of Papeete, is sometimes one island and sometimes two, for it is divided by a strait which, at low tide, becomes an isthmus. This combination island, 20 miles in circumference, is 7 miles from north to south by 4 miles in width, and the portion that lies to the north of the strait (or the low-water isthmus) is somewhat the larger of the two. The greatest elevation on Huahine-nui, the northern portion, is Mt. Turi, 2,230 feet, and on Huahine-iti, Mt. Maufene reaches 1,495 feet.

The island is surrounded closely by a coral reef, and the population is 1,283. The products, though far less in quantity, are the same as those of Moorea and Tahiti.

Nineteen miles directly west of Huahine are the two closely associated islands of Raiatea and Tahao, which are separated by a 3-mile strait, but which lie within the same surrounding coral reef.

Raiatea, the southern of the two, is the second largest island of the Society group, though it is only barely greater in area than Moorea. About 13 miles in length by 8 in greatest width, its coastline measures 30 miles and its axis lies north and south. Its highest peak is Mt. Temehani, which reaches 3,388 feet.

Tahao lies directly north of Raiatea, and is roughly circular, with a diameter of 6 miles or so. It is less fertile and more lightly populated than its larger neighbor. Mt. Ohiri, 1,936 feet, is near its center.

Tatutapuatea, formerly an important place of heathen worship, is on Raiatea, and from this center many religious forms were scattered throughout Polynesia. Even yet the remarkable native ceremony of fire walking is periodically carried out on Raiatea. In these ceremonies large pits are filled with stones heated in fires until they are almost red-hot, and the native participants in the rites walk slowly with bare feet, but without harm, across these overheated stones.

The usual products of the group are grown on these islands, but perhaps oranges and grapefruit predominate. The population of the two is just over 4,000.

The much smaller island of Bora Bora lies 9 miles west by north of Tahao. Only $2\frac{1}{2}$ miles by 4, it is rugged and abrupt, with central Mt. Taimanu reaching an elevation of 2,379 feet. It is surrounded by a barrier reef from which rise a number of low islets very similar to those of the Tuamotus. On its western side, but within the reef, lies the

mile-long island of Tupua between which and the main island is the excellent harbor of Teava-nui. The principal village of Vaitapo faces this harbor, and behind it rises the picturesque peaks that culminate in Mt. Taimanu. The population of the island is 1,330, and its products are the same as those of the islands to the east.

The island of Maupiti is about 30 miles west of Bora Bora and is less than 2 miles in length. It reaches a height of about 800 feet and has no streams, but the 250 people of the place obtain their water from a few springs near the shore. Surrounding the island is a barrier reef which encloses a lagoon that is 2 to 3 miles wide all about the island. The lagoon is teeming with fish. Only one pass lies through the reef, and it is dangerous, so the island is rarely visited. The people are fishermen and the island's other products are limited.

The other four islands of the Leeward Group are small and uninhabited. Motu-iti is a 5-mile atoll 8 miles north by west of Bora Bora, and Billingshausen, Scilly, and Mopiha are three more little atolls that lie from 150 to 190 miles to the west of the same island.

The climate of the Society Islands is damp and somewhat hot, though it is not depressing even to Europeans. There is little variation in the weather, and, considering the fact that the archipelago lies well within the tropics, the islands are healthful. More rain falls between December and April than during the rest of the year, but there are no rainy and dry seasons in the ordinary sense. During the periods of greater rainfall the wind blows mostly from the northwest, and thunderstorms are frequent. Hurricanes blow at times, but they are rarely destructive. During the "drier" months the southeast trade winds prevail, but southerly winds—and sometimes westerlies—occasionally interrupt the trade

winds. The mean annual temperature on the coasts is about 77 degrees, with a maximum approaching 90 and a minimum of 68 or slightly less.

The flora of the group, which is luxuriant and adds so greatly to the beauty of the islands, is poor in its number of species. Trees and shrubs are more common than lesser growth, though orchids and ferns are plentiful. Extraordinary banana thickets are frequently to be found on the higher slopes at altitudes of 3,000 to 5,000 feet.

In some places along the shores and in other lower and more fertile sections, tropical fruits and other exotic plants that have been introduced from other portions of the world sometimes grow so rapidly as to crowd out the local species.

As is so often the case on the smaller tropical islands, the native fauna is remarkably restricted. Apparently only a few bats, rats, and mice existed there before men arrived. It would appear that even when men came they introduced no other animals for centuries. But finally the pig and the dog were introduced. Since the discovery of the islands by white men, cattle and better strains of hogs have been brought to the islands, and domestic fowls have long been raised by the natives.

There are few birds indigenous to this island group. Several species of parrots, together with doves, pigeons, rails, sandpipers, thrushes, and one or two others are known but sea birds congregate there in great numbers. Insects are not common, but the lagoons are rich in many species of fish. Crustaceans and molluscs are numerous, although, rich as the coral growth is, only a few varieties are represented.

The natives of the Society Islands are typical Polynesians, physically similar to the Marquesans, but widely different in many of their customs. The men are tall and the women are among the most attractive in the Pacific. In their sym-

metry the people are unsurpassed, though great corpulence is not uncommon.

In color they vary from olive to brown, but that may be due to greater or less exposure to the sun, for chiefs and women, who face the elements less than most of the active men, are likely to be lighter in shade. Their hair may be black or brown, and is usually wavy or slightly curly. Their eyes are expressive and very dark. Their broad noses are less flat than early accounts reported, for formerly the bridges of infants' noses were artificially flattened. Their mouths are large, their lips full, their teeth fine, and their chins well formed.

The dialect of the Society Islands is similar to those of most of the islands of Polynesia, though it is somewhat softer. As with the Hawaiians and Marquesans, vowels predominate, and many words, though slightly different, are essentially the same. For instance, the Hawaiian salutation "aloha" (which also means love) becomes "kaoha" in the Marquesas and "aroha" in Tahiti. The Hawaiian word for house is "ha-le," whereas in the Marquesas it is "ha'e" and in the Society Islands becomes "fa-re."

Originally the native costume was an oblong piece of bark cloth with a hole in the center for the head, and a cloth around the loins was worn by both men and women of the higher ranks. Men of all ranks wore, with or without these garments, a kind of breechclout, sometimes called a T-bandage, and the women concealed their breasts except in the company of their superiors. The chiefs wore short cloaks and "breastplates" of black and red feathers interwoven with sharks' teeth. The priests had odd hats made of wicker, circular and two or three feet high. Tattooing of both sexes was general.

The houses usually are long, low, and open at the sides. Most of the cooking is done with heated stones in holes in the ground or over open fires. Originally the people of

these islands had no metal and made no pottery, but they made a few wooden utensils. Fish hooks were fashioned of wood and shell, and tools were often of stone, though they made spears of wood and knives of bamboo. Their musical instruments were few: a nose flute, a drum, and—perhaps less a musical instrument than a mere noisemaker—the conch shell. In addition to spears they used clubs and slings. Bows and arrows seem to have been merely ceremonial.

Their canoes, from 18 to 60 or 70 feet in length, are either single-hulled outriggers or double-hulled catamarans. They are not highly finished, though they sometimes have tall and highly decorated ornaments at the bow. Excellent seamen, these Polynesians steer by the stars and voyage at will among their islands.

Cannibalism was never practiced, but human sacrifices were sometimes offered to the gods. Their principal foods are breadfruit, taro, yams, plantain, fish, pigs, and dogs. Dogs, however, are frequently pets so pampered that the women often suckle the puppies, even to the exclusion of their own children.

These islanders tended the land carefully and in some places had developed a crude system of irrigation.

Chiefs—at least the major ones—were surrounded with an aura that seems to have had something of the sacred about it. Certain lands were inherited by certain classes, and these landowners were the makers of canoes and weapons. Some of the people were slaves, but were classed with fishermen and ordinary artisans.

Rank was hereditary and descended by primogeniture, but not necessarily to sons. Women often ruled as chieftainesses, and the authority of Queen Pomare, whom the French deposed, was never questioned by her people.

The Tahitians are lighthearted, generous, and extremely courteous, but on many occasions in the past they have proved that they could be both cruel and deceitful. They

have always been notorious for their immorality, one of their customs being the somewhat casual interchange of wives. Fond of singing, dancing, and oratory, they also indulged in wrestling, spear throwing, and foot racing. Canoe racing, too, was popular, but swimming was their favorite sport.

The temples are tree-surrounded squares, each with a single entrance but with several courts. A pyramidal stone altar stands in the square opposite the entrance, and dead chiefs are buried within the square, their skulls being kept in the houses of their nearest relatives. In one temple on the island of Tahiti the pyramidal altar structure was nearly 300 feet long, almost 100 feet wide, and about 50 feet in height.

Sacrifices—including human sacrifices—were an important part of their worship. Oro was their most important god, but there were many others, and every household had its own spirit guardian. The wooden images of these deities were merely rough wooden carvings in human form.

The archipelago was discovered in 1607 by Pedro Fernandez de Quiros, and rediscovered and claimed in 1767 by the Englishman Samuel Wallis. The next year Louis de Bougainville claimed it for the French, but neither claim was seriously upheld. In 1772 a Spanish settlement was begun, but failed within two years.

In 1769 the British Royal Society sent out a scientific expedition to observe the transit of Venus across the disc of the sun, and as Tahiti was in the right position for the observation, the expedition went there. The scientists traveled on H. M. S. *Endeavour* which was commanded by Lieut. James Cook, who later was to become the famous explorer of the Pacific, Captain Cook.

In 1772 the British dispatched H. M. S. *Bounty* to Tahiti to obtain some breadfruit which was to be planted in the

West Indies. The ship was commanded by Lieutenant Bligh whose harsh attitude toward his officers and crew precipitated the mutiny which, ever since, has been one of the most remarkable stories of the sea.

By 1797, Protestant missionaries had arrived and when, in 1838, a group of French Catholic missionaries attempted to enter this field they were driven off by the natives, who were no doubt under Protestant influence. This stirred up the French, and by 1843 they had taken over the islands as a "protectorate." Ultimately, in 1847, Queen Pomare (one of a line of able rulers) accepted the French action. For some years the natives opposed the French and there was some fighting, but now, for half a century or more, they have been quiet and are apparently contented.

The French Establishment of Oceania is now administered by a governor, a cabinet, and certain sectional administrators, all of whom are French, and the Society Islands form the most important part of this French Empire of the far Pacific.

Under present conditions the Society Islands have no vital strategic value, though Papeete can be used as a refueling point for ships running between South America and Australia or New Zealand. Still, its port facilities are limited, its supplies, aside from fruit and vegetables, must be shipped great distances, and it is not heavily protected from attack.

With about 30,000 people, some two thirds of whom are on the Island of Tahiti, and with natives forming about 80 per cent of the total, the archipelago is more important to tourists than to military or naval men. The important sea routes of the Pacific do not pass close enough to these remote islands to make them strategically vital to the world today.

The Tubuai Islands

Seven widely scattered little islands stretch in an 850-mile curve from northwest to southeast, with the northwest section of the chain about 330 miles directly south of the Society Islands. These are the Tubuai, or Austral Islands. None of them are large, for all seven total only 115 square miles, and none of them are populous. Two are actually uninhabited, and the remaining five support only about 3,000 people.

From northwest to southeast the inhabited islands are Rimatara, Rurutu, Tubuai, Raivavae, and Rapa. The uninhabited islands are those that stand at each end of the chain—Maria, or Hull, Island at the far northwest, and Ilots de Bass (or Bass Rocks), also known as Marutiri Island, at the extreme southeast.

Maria, or Hull, Island, is nearly 400 miles southwest of Papeete, Tahiti, and is a tiny, triangular, uninhabited atoll, made up of a reef and four islets on which there is nothing but a few coconut palms. A hundred and forty miles east-southeast of Maria Island, is Rimatara, a well-wooded, well-watered island about $5\frac{1}{2}$ miles in diameter, but with an altitude of only 30 feet. With a population of about 400 people, it has three tiny villages—Amaru, Anapoto, and Motuoura. It has no harbor and fish are scarce in its waters, but taro, oranges, bananas, and breadfruit are grown, and pigs are raised.

Ninety miles east and a little north of Rimatara is the slightly larger island of Rurutu. It is oval, about 5 miles long from north to south and 3 miles wide, and supports two villages—Moerai on the western side and smaller Avera on the eastern. The island has no harbor, but if the anchorage on one side is rough, the other is likely to be smooth.

Rurutu is higher than Rimatara, but is not to be called an elevated island. Its "uplands" are grass-covered, the few ravines are thick with undergrowth, and much of the inland is given over to coconut palms; for the natives, of whom there are about 1,000, depend largely on their crop of copra, though some vanilla and arrowroot are grown as well.

The island is volcanic, but is much eroded, and it is surrounded by a coral reef. The people are similar to those on Rimatara, but because their principal food is taro, the elderly are apt to be corpulent. They raise a few cattle and pigs, and own their own schooners, by means of which they take their products to Papeete, which is 350 miles to the north and east.

For 120 years these islanders have been Christians, and most of them had learned to read and write by 1822. Their way of life has come to be somewhat European, though only five Europeans live among them, and outsiders may no longer visit Rurutu, owing to the French Government's desire to keep the people unspoiled.

Tubuai is another oval island, 5 miles by 3, and lies 190 miles southeast by east of Rurutu. The island has a barrier reef with a pass on the northern side and is of some elevation. Mt. Taiti, 1,309 feet, is near its eastern end, and Mt. Tonarutu, 1,024 feet, near its western. A French gendarme lives in the village of Mataura, but he is the only governmental representative.

The population of Tubuai and that of Raivavae, which is 60 miles to the southeast, total 1,389, among whom are to be found eight or ten Europeans and Americans, and a few Chinese.

The climate of these two islands is healthy and temperate, and the products are the same. Oranges, coffee, copra, and arrowroot are the main products, and some cattle and pigs are raised.

Rapa, 325 miles southeast of Raivavae, is the last inhabited island of the group. It is 6 miles from north to south and is shaped like a single quotation mark. It has a dozen good harbors, but the best of them is the large central one that gives the island its unique shape. The village of Ahurei is almost hidden in foliage on the southern shore of the principal harbor, and two mountains of about 2,000 feet rise toward the western side of the island. In 1850 the island had a population of about 2,000, but only 200 live there now, the reduction being mainly on account of the introduction of Western diseases.

These people, like those of Tubuai and Raivavae, have been Christians for more than a century, but the men of Rapa are seamen rather than farmers. On this account the real population of the island is probably larger than it appears to be. A large part of the 200 who are normally to be found there are women, the men being employed on ships that keep them from home.

Fifty miles east-southeast of Rapa lie the four tiny uninhabited islands called *Ilots de Bass*. They rise 346 feet from the water, but are rarely visited except by birds.

These distant, minute islands in the otherwise empty southern ocean offer nothing of importance in the way of resources, and their semi-Europeanized Polynesian populations play a small part in the world. Far from the Pacific Ocean's main sea routes, the people and the islands of the Tubuai group are almost in a separate world—a world important only to their simple, workaday selves. This island group plays an insignificant role in the great world of which it forms so small a part.

There is nothing more in this widespread "French Establishment of Oceania" except the three uninhabited Duke of Gloucester Islands. These three, 470 miles southeast by

east of Tahiti, and 360 miles northeast of Raivavae, are the islands of Bedford, Miseo, and Melbourne, which the Polynesians call Anu-anuraro, Anu-anurunga, and Nukitipipi. Each of them is rounded and heavily wooded, and none of the three has harbors or the protection of a reef. Pounded forever by the heavy surf, they lie deserted and alone.

Aside from the scores of islands that make up the four French-controlled archipelagoes in the South Pacific, only five lone islands in all this vast portion of the sea remain to be described. Four of these are British and one is Chilean—Oeno, Henderson, Ducie, and Pitcairn, and, more than 1,000 miles farther to the east, Easter Island.

Oeno, Henderson, Ducie, and Pitcairn

Three hundred miles east and a little south of the Gambier Islands, which lie at the eastern extremity of the Tuamotu Archipelago, is the first of three uninhabited little coral islands. This is Oeno Island. Almost 200 miles farther east is Henderson Island, and Ducie Island lies more than 200 miles farther on. Unclaimed until a few years ago it occurred to the British that someday these little dots of land might be useful as mid-sea landing places for sea-planes that may wish ultimately to fly across these empty seas. So now a sturdy sign is set up on each of these dots of coral, claiming it as a part of the territory of His Majesty King George VI.

Each of them has a small lagoon that is protected by a few spits of sand and a reef. There is nothing more.

But 110 miles south and a little east of Oeno Island, 25 degrees south of the equator and 130 degrees west of Greenwich, lies Pitcairn, 2 square miles of land that rises to an elevation of about 1,000 feet.

This is the island to which nine of the mutineers of H. M. S. *Bounty* made their way in 1789 with a few Tahitian men and women, and where, nineteen years later,

the last remaining one of the mutineers, together with a few of the women who had originally joined them, was found by an American trading vessel, living with the numerous progeny of the original group.

Today descendants of the mutineers of the *Bounty* still live there. Others, long ago, were taken to Norfolk Island, which lies within 1,000 miles or so of Australia, and about 600 of their descendants live there now. But some preferred to remain on Pitcairn, or to return. Adamstown, with about thirty thatched wooden houses and a church, stands at the top of the cliff on the island's northern side, and about 175 people, all of whom are a mixture of English and Tahitian, live there today.

The island has no significance and no importance, except to dramatize one of the most remarkable stories of the sea and, a century and a half later, to make it seem more real.

Easter Island

One thousand, four hundred miles directly east of Pitcairn, and 2,000 miles west of the coast of Chile, lies Easter Island. Discovered on Easter Day, 1722, by the Dutch Admiral Roggeveen, it has, from then until now, been an enigma to those who have tried to determine the origin of its people.

The island is roughly triangular, with its longest (southeast), 12-mile side running from northeast to southwest. Each of its three rounded angles is marked by a small extinct volcano, one of which reaches 1,768 feet, and the area of the island is 45 square miles. There is no harbor, and landing is difficult. The land is fertile and grass-covered, and, though there are no streams, rain is sufficiently regular to make up for running water. Perhaps the island was wooded at one time, but now only shrubs, ferns, grass, and sedges remain.

At the time of its discovery the island contained between 2,000 and 3,000 people, but today no more than one tenth that many still survive, for Peruvian slave ships kidnaped many of them and the white man's diseases did the rest. They are a strange race and show no characteristics by which their origin can be determined.

Neither can they explain the strange, gigantic stone platforms built long ago upon the island, or the weird and giant statues for which the island is famous. Some of the platforms, which stand on seaward slopes and headlands, are from 200 to 300 feet in length, as much as 30 feet in height on the seaward side, and 30 feet or more in breadth. On the land side of these are great stone pedestals on which once stood the unexplained Easter Island colossi—huge figures, a few of which are more than 30 feet high. All of them are remarkably similar in appearance, with prominent noses, deep eyes, and strong chins. Carved from the gray lava of which a part of the island is made, most of them have long since fallen to the ground, and though archeologists and ethnologists from the world's leading scientific institutions have attempted to explain these ancient figures and structures, no answer to the question has yet been evolved.

Aside from this archaeological mystery and the ethnological one that goes with it, Easter Island presents nothing of importance to the world.

The natives are herdsmen and little more, and the island, for all its mystery, is now little more than a mid-sea sheep ranch visited once a year by a schooner from the mainland of South America.

CHAPTER FOUR

Scattered Islands of Mid-Pacific

BETWEEN THE MERIDIANS of 155 degrees and 170 degrees west longitude, or, to put it another way, from the Society Islands westward to Samoa, lies an expanse of ocean almost 900 miles in width in which islands are both few and very small. More than 2,000 miles to the north the Hawaiian Islands lie athwart these meridians, but south of Hawaii in this 900-mile swath there are fewer islands than are to be found in any other comparable area in all this island-dotted section of the Pacific.

East of this region are the many islands of eastern Polynesia. West of it lie other Polynesian islands, followed in turn by Micronesia and Melanesia, in the first of which the islands grow in number while in the second they grow in size.

Only one archipelago of any importance—the Cook Islands—lies in this thinly dotted section of the sea, and it is one of the Pacific's minor groups. Another little group is sometimes called the Northern Cook Islands and sometimes the Manihiki Islands. Certain others are hardly a group at all and usually go without a name, though occasionally they are referred to as the America Islands. In addition there are a few other islands each of which is detached and alone. Altogether in about 1,500,000 square miles of sea there are only thirty islands, the largest of which measures no more than 94 square miles in area.

Wilder Shoal

Kingman Reef

PALMYRA I.

WASHINGTON I.

FANNING I.

CHRISTMAS I.

MARIS

Winstow Reef

CANTON I.

M'KEAN I.

ENDERBURY

BIRNIE I.

PHOENIX I.

PHOENIX ISLANDS

GARDNER I.

MULL I.

SYDNEY I.

Carondelet Reef

MALDEN

STARBUCK

ATAFU

TOKELAU

WUKU RONO

GROUP

FAKAOFU

MANIHIKI ISLANDS

TONGAREVA I.

CAROLINE

RAKAMANGA

MANIHIKI

YOSTON

FLINT

Robbie Bank

SWAINS I.

DANGER IS.

NASSAU

SUVAROV IS.

Field Bk.

SAMOA ISLANDS

SAVAII

APOLU

PAGO PAGO

Palauli

OFU

TAFU

Curacao Reef

RHUATOSUTABU

UEA (WALLIS I.)

Fusco Bk.

NIUAFOU

TAFU

FAMUA LAI

TOKU I.

LATE I.

YAKAU GROUP

NIHAU FASI SANDRANK

TONGA

HAFO

HAFAI GROUP

ISLANDS

TONGATAPU GROUP

LUAI I.

ATA

NIHE IS.

Beveridge Reef

PALMERSTON IS.

ATUTARI

HERVEY IS.

TAKTEA

ATU

MITIARO

MAURE

KURUTONGA

MANGA

MARIS IS.

TUBUAI IS.

BIRATANA

TUBUAI IS.

BURU

The Southern Cook Islands

A handful of pebbles dropped at random might create some such pattern as is formed by the eight islands of the Southern Cook Archipelago which are scattered over an area about 400 miles square in the general neighborhood of 20 degrees south latitude and 158 degrees west longitude. Rarotonga, the principal island of the group, lies approximately 600 miles west-southwest of Tahiti. The others of the group, in the order of their size, are Mangaia, Atiu, Mauke, Aitutaki, Mitiaro, the Hervey Islands—the twin islands of Manuae and Te-au-o-tu—and uninhabited Takutea.

The group forms a part of a New Zealand dependency which is administered by the Cook Islands Department of the New Zealand Government at Wellington, New Zealand, through a resident commissioner at Avarua, Rarotonga.

The Island of Rarotonga

Rarotonga, the largest and in every sense the most important island of the group, is also the most southwestern, lying 21 degrees south of the equator and 159 degrees 45 minutes west of Greenwich. It is oval in shape and measures $4\frac{1}{2}$ by 7 miles. Volcanic in origin, its central portion is made up of a group of bold, steep, heavily forested hills, several of which reach an altitude of about 2,000 feet. About this elevated central portion is a rich coastal lowland a mile or so in width, and the entire island is fringed by a coral reef, within which there are a few small lagoons. At Avarua on the northern coast two tiny harbors permit trading schooners to enter, and on the eastern shore the village of Muri is on a somewhat larger harbor, but ships of any size must anchor offshore.

Most tropical and subtropical fruits and vegetables can be successfully grown, and even potatoes can be raised

on parts of the island, but oranges, bananas, tomatoes, and copra are the principal exports.

The population is about 5,000, of whom only about 200 are other than the Polynesian natives.

The Island of Mangaia

About 120 miles east-southeast of Rarotonga lies the slightly smaller island of Mangaia. Roughly hexagonal, about 6 miles in greatest diameter and less productive than Rarotonga, Mangaia is far less beautiful, but is geologically somewhat more remarkable.

Its center is formed of a group of low, round-topped hills which are probably of volcanic origin, and which nowhere surpass 550-foot elevation. The gentle valleys in these hills usually terminate in swamps, though one ends in a little lake which apparently has an underground outlet to the sea. Entirely surrounding this inner region of hills, valleys, and swamps is a cliff of coral limestone called by the islanders the "makatea." This encircling wall makes an unbroken circuit of the island and forms a strangely uniform rampart 115 to 230 feet in height, with a breadth that varies from a few hundred yards to a mile. In part this makatea is of bare rock, worn to many sharp pinnacles on which ordinary shoes are promptly cut to shreds, and the whole formation is riddled with caves—small and large—many of which are long and irregular. Within these caves stalactites and stalagmites are found and formerly some of the caves were used by the natives as burial grounds.

Much of the makatea is covered with rich, red soil, and the low sandy fringe of the island that surrounds this natural bastion varies from a couple of hundred yards to a mile or so in width. Obviously this elevated wall was once a coral reef that surrounded the island at sea level. But after the reef had been created some subterranean force lifted the entire island, reef and all, thus enlarging the

island's area and leaving the now dead reef well within and well above the new coast line. A narrow new coral reef now fringes the island. The main settlement is the village of Oneroa on the island's westward side. It has no harbor and lies partly at the foot of the makatea and partly on top, with steps cut in the limestone in lieu of connecting roads. On the inner side of the makatea, too, steps are cut leading down to the swamps and the agricultural land within.

About 1,500 people, of whom all but eight or ten are natives, inhabit the island, and the products are about the same as those on Rarotonga, though the sandy fringe outside the island's natural wall is given over almost exclusively to coconut trees.

The Smaller Cook Islands

Grouped somewhat more closely together are the six remaining islands of the Southern Cook Group. Atiu, the third largest of the group lies about 120 miles due north of Mangaia and the same distance northeast of Rarotonga. Roughly 4 miles in diameter, it is, because it also has a makatea, somewhat similar to Mangaia but less elevated.

About 50 miles east of Atiu is lesser Mauke, an island some 2½ by 4 miles in size. Still lower in elevation than Atiu, it also is of the same general geological formation, makatea and all.

Together these two islands support nearly 1,600 people, and they produce the usual Cook Island products though they export only oranges, lemons, bananas, and copra.

Mitiaro is a narrow island 4 square miles in area that lies about midway between Atiu and Mauke but a little to the north. Barren and rocky at each end it has a small area of fertile soil near its center. It produces little besides copra, though some sandalwood and a false sandalwood called "maramia" grow there. Fewer than 300 natives live on the island.

Sixteen miles northwest of Atiu lies the small, low uninhabited Takutea. A few coconut trees grow there, but except as the natives of near-by Atiu visit it to collect the nuts, the island is no more than a breeding place for birds. Fifty miles farther on to the northwest, however, are the double islands of Manuae and Te-au-o-tu.

In reality this double island is a coral atoll, with the two islands forming its eastern and western sides while the surrounding reef completes the oval on the north and south sides of the central lagoon. The eastern island—Te-au-o-tu—is kidney-shaped, 2 miles north and south by 1 mile in width. The other island—Manuae—lies on the western side of the 2-mile-wide lagoon, and is shaped a little like a fishhook with the barbed end curving up into the lagoon from the south. It is 3 miles around its curved length, and its northern end broadens out into a triangle almost a square mile in area. Normally uninhabited, ten or a dozen natives are kept there by a copra firm to look after the island's coconut palms.

Finally, some 55 miles to the northwest of Manuae and Te-au-o-tu, is the island of Aitutaki. Chiefly volcanic, but with an extended coral reef that lies well offshore on the eastern and southern sides, it combines with its volcanic hills some of the main characteristics of a coral atoll.

Aitutaki, as a whole, is triangular in shape, with each side about 7 miles in length, but with the 4-mile main island forming the northern angle and extending part way down the northwest side where the coral reef fringes its beach. Elsewhere small islands stand on the reef, to a total of a dozen, though most of these lie on the eastern side. The lagoon within is 5 miles across.

Roughly 1,700 natives live on Aitutaki, which produces fully as many different products as any island in the group and is exceeded in the quantity of its exports only by Rarotonga. The island has plenty of rainfall but it has no

streams. A bored well among the low interior hills of the main island and a few springs near its beaches supply the island's drinking water. Arutanga is the principal village and lies near a pass through the reef on the western side of the main island.

The Manihiki, or Northern Cook Islands

Lesser in size and much more widely scattered than the Southern Cook Islands, the Manihiki, or Northern Cook Islands, are a part of the same New Zealand dependency of which the Southern Cooks form the more important part. Altogether these more northern islands, of which there are seven, have an area of only 14 square miles, and a total population of less than 2,000.

Palmerston Island is the most southerly, and lies 200 miles west by north of Aitutaki and 270 miles northwest of Rarotonga. About 1 square mile in area, and with a reef through which only a few dangerous passes open, the island produces little but copra, for which a trading schooner calls once a year, bringing food and other supplies in exchange.

There is little of interest about the island except that its inhabitants, of whom there are about 100, are almost all the descendants of a certain William Masters, an Englishman who settled on the island more than a century ago. Partly English and partly Polynesian, they speak a strange sort of English, and are, of necessity, skillful boatmen.

Suvaroy (or Suwarow) Island lies about 300 miles directly north of Palmerston. It is a small, uninhabited atoll and has been proclaimed a bird sanctuary.

Two hundred miles northeast of Suvaroy is Manihiki Island, a typical atoll with a beautiful lagoon which is dotted with islets on which coconut palms grow. Though the land area of Manihiki is only 2 square miles, it is more pretentious in appearance than its area suggests. An ir-

regular triangle with sides 6 to 7 miles in length, it is made up of a dozen major islets and many minor ones. The largest islet, which is nowhere more than 400 yards in width, is slightly over 6 miles in length, and extends in a great sweep throughout most of the atoll's straight northeastern side. On the western side a slightly wider islet extends for 3 miles with lesser islands at each end. It is the southern and most irregular side of the triangle that is made up of lesser islets and with water-covered sections of the reef.

About 450 natives inhabit Manihiki. They dive for the island's pearl shell, and also produce copra. Tukao, at the northern tip, and Tauhunu, on the western side, are the island's two villages.

Twenty-five miles northwest of Manihiki is Rakahanga, another atoll. The area of its islets is about the same as those of Manihiki—2 square miles—but the whole atoll is much more compact, the lagoon much smaller, and the islets are broader in proportion to their length.

The whole atoll measures 3 miles north and south by about $1\frac{1}{2}$ miles in width, and is a somewhat regular rectangle. The lagoon is completely surrounded, except for four passes, by land that is from a quarter to a half mile in width, but the passes are very bad and an artificial one through the reef on the south side is generally used. A neat and well-planned village is at the southeast corner, but fewer than 300 people live on the island and it raises little besides coconuts. Fish, of course, are plentiful in its excellent lagoon. The island is plagued by coconut crabs and rats which destroy many coconuts and much of the island's other food.

Nearly 300 miles west and a little south of Rakahanga are the Danger Islands, another atoll sometimes called Pukapuka. This atoll is triangular with each of its three islets forming the angles. The eastern side of the atoll is 5 miles in length, while the southwestern and northwestern

sides are each 4 miles. The three islands are connected by semi-submerged reefs which form the atoll's three sides.

About 600 people occupy this atoll and produce a little copra and pearl shell, but the island is rarely visited even by trading schooners and is the most isolated of the group. The little village of Roto is on the northern islet.

Tema Reef, which barely breaks the surface of the sea, lies a few miles southeast of the Danger Islands, and Nassau Island lies 45 miles to the southeast. It is less than one half a square mile in area and is uninhabited. It is, however, planted to coconuts and is visited from the Danger Islands periodically.

About 300 miles east, and a little north, of Rakahanga lies the atoll of Tongareva, or Penrhyn Island. Its land area is only 3 square miles, but its lagoon is 108 square miles in area and its reef is almost 40 miles in circumference. It is made up of a dozen islets, two of which are each about 5 miles in length, but all of which are very narrow; among the openings between these islets are three chief boat passages, one of which is 21 feet deep and 40 yards wide. Thus Tongareva offers what is undoubtedly the best harbor in all these scattered islands. Fairly large vessels may enter and tie up at Omoka, the island's main settlement, which lies on the western side, and, except for Suvaroy, is the only place in the archipelago where schooners can tie up with any safety during the hurricane season.

Some 450 people live on this atoll, and their main products are copra and pearl shell.

The America and Other Scattered Islands

To the north and to the east of the Northern Cook Islands are a dozen scattered islands the northernmost of which—four of them—are sometimes called the America Islands. These lie in a 400-mile line stretching from the northwest to the southeast just north of the equator to the

east and west of the 160th meridian, and Palmyra Island, except for a reef or two, is farthest to the north and west. Discovered in 1802 by Captain Sawle of the American ship *Palmyra*, this 1½-square-mile atoll was not thought worth claiming until 1935 when the United States, thinking to use it as a way station on the Hawaii-New Zealand airplane route, decided to raise the American flag there. This was formally done in 1936, and Palmyra, despite its limited size, is now an important little link in one of the world's great overseas air routes.

Washington Island, a British atoll, is 140 miles southeast of Palmyra, and is about 9 miles in circumference. It has no indigenous population but 125 Gilbert Islanders are normally employed there to care for the coconut palms of a plantation, and the island is under the control of the district commissioner of Fanning Island, which lies 70 miles farther to the southeast.

Fanning is an oval atoll about 34 miles around, but the land of the atoll is at no place more than 9 feet above the sea or more than a half mile across. A pass on the southwest side permits the entry of small ships and provides a sheltered anchorage.

Fanning Island is a mid-sea station on the Pacific cable between Canada, the Fiji Islands, New Zealand, and Australia, and on that account is far more important than it would otherwise be. Normally there are about 30 Europeans and 175 Gilbert Islanders on Fanning, the Europeans being employees of the cable company and their families, and the Gilbert Islanders being employed to raise and harvest coconuts.

The southeast trade winds blow almost throughout the year and storms are very rare. Many sharks live about the island, but there are so many other fish for them to feed on that they do not bother bathers.

Christmas Island lies 160 miles southeast of Fanning

and is less than two degrees north of the equator. It is a large atoll shaped very much like a short-stemmed pipe with the "stem" containing a long, narrow lagoon of its own, but with the "bowl" containing the principal lagoon which measures about 10 by 15 miles.

The land areas of Christmas Island are unusually large for an atoll, and total about 60,000 acres, or almost 94 square miles. The "bowl" of this great pipe is approximately 18 miles east and west by 20 miles north and south, while the "stem" is about 20 miles long and 5 miles in width. Twelve hundred acres on this atoll are planted to coconuts.

In 1936 the United States questioned Britain's control of the island, and the British sent an official there. Since then an arrangement has been entered into by the United States and Britain under which the two countries share the use and control of the island. It is obviously of more than usual importance as a mid-ocean airplane landing place.

This Christmas Island should not be confused with the other Christmas Island which is also a possession of Britain and which lies in the Indian Ocean.

Christmas Island is the southernmost of the America Islands, but other scattered islands lie to the south. Altogether there are eight of them in that portion of the Pacific south of the America Islands and north of the Northern Cook, or Manihiki, Islands.

Jarvis Island is one of these. It lies 190 miles southwest of Christmas almost exactly on the equator where it is crossed by the 160th meridian of west longitude.

Small, barren, and regarded for a hundred years as worthless except for its deposits of guano, it was annexed by Britain in 1889. Nothing was done with it, however, and when, in 1935, the United States claimed it Britain did not object. It has no indigenous population but is well located as an airplane landing place.

About 275 miles southeast of Jarvis Island lies the island of Malden. It is the property of Great Britain and is administered through the High Commissioner of the Western Pacific. The island, 12 miles long and 6 in width, has considerable guano deposits which are being worked, and the employees of the guano company are the only inhabitants of the island.

This island, which has no fresh water and on which, without outside supplies, human life could not be maintained, has, oddly enough, some temples of stone which have never been explained. Truncated pyramids surrounded by low terraces, the temples are connected with paved roads or walks that lead down almost to the sea, but how or when they were erected, or by whom, no one has been able to say. The island has no indigenous life on it except a few scrubby shrubs.

Starbuck Island, 160 miles southwest of Malden, is a small guano island, the deposits on which are now worked out. About one square mile in area, it is now uninhabited.

Almost 500 miles southeast of Starbuck and 400 miles east of Tongareva Island, three tiny islands lie in a hundred-mile triangle. These are Caroline, Flint, and Vostok islands.

Caroline Island (which should not be confused with the Caroline Archipelago that lies 3,000 miles to the north and west) is a low-lying atoll on which one European manager, with the aid of a few Polynesian laborers, cares for a 30,000-tree coconut plantation. A hundred miles west and south is the low, sandy, uninhabited islet of Vostok, and south by east of Vostok about 70 miles is Flint Island. This coralline island is 3 miles long and one half a mile wide. Entirely surrounded by a coral reef, it nowhere surpasses 25 feet in elevation. Formerly the island produced some phosphate rock, but that is now worked out and a single European, with 30 or so Polynesian workmen, cares for a plantation of 30,000 coconut trees. The island is visited about four

times a year by a trading schooner which brings supplies and takes away the copra.

All three of these small islands are British.

Niue Island, which is sometimes called Savage Island, is far removed from the preceding atolls and guano islands. It lies 19 degrees south of the equator and 170 degrees west of Greenwich, and so is about 580 miles west by north of Rarotonga. It is a New Zealand dependency and is administered separately through a Resident Commissioner at the village of Alofi on the island.

Niue, 15 miles from north to south and 10 miles wide, is the largest island that has been annexed by New Zealand. The island has no great elevation, and in general it is formed of two terraces, the lower about 90 feet above the sea and the higher about 220 feet. It is made of upheaved coral, contains many deep chasms, and the heavily wooded interior is uninhabited.

Copra is the main product, though bananas are grown and exported. The large interior forests contain much ebony and other hard woods, but they are not produced in quantity because of the inaccessibility of the central region.

There is no surface water, though some brackish water is to be found in the many deep caves. Rain water supplies the population's needs.

The island is healthful, has no malaria, and the native population of 4,000 is slowly increasing.

There is a boat landing through the fringing reef at Alofi, on the island's western coast, and two or three other landing places exist.

About 20 Europeans live on the island.

The climate of these widely scattered islands does not differ very widely, though the more southern of them are

in the hurricane belt and the more northern are equatorial and therefore warmer. But even those closest to the equator have the heat of the sun modified by the vast ocean that surrounds them.

The flora of many of these islands is limited, as is not uncommon here in mid-Pacific, and the fauna is more limited still. Birds are usually numerous but mammals and insects hardly exist, though fish of many species are usually plentiful, especially in the many lagoons.

The people are Polynesians closely related to the peoples to the east and west of them. They themselves recognize this relationship and know the surprisingly accurate folklore that tells of their forebears who came to these islands by way of Samoa. The relationship is so close, in fact, that the language of the Cook Islanders is readily understood by the Maoris of New Zealand, the Samoans, and even by the Tahitians, though in conversing with these latter Polynesians the Cook Islanders make themselves understood more readily by dropping or slurring their "k's."

So close is the kinship between the people of the Cook Islands and those of the surrounding archipelagoes that these various islanders are interested in each other as in close relations. And not only are their dialects closely related. Their customs and their native religion are very much the same and, in general, a description of the activities of the Tahitians or the Samoans applies to these people who live between the two larger archipelagoes.

The lower Cooks were discovered by Captain Cook on his second voyage—1772-75—when he touched first at Manuae, which, with its near-by islands, he named the Hervey Islands after the then First Lord of the Admiralty. Rarotonga, the largest of these islands, was not discovered until 1820.

Christian missionaries were in the islands by 1823, and Christianity took hold rapidly among the natives; but it

was not until 1888 that the British took the islands "under their protection." In 1889 New Zealand became responsible for their administration. The scattered British islands north of the equator are administered by the British High Commissioner for the Western Pacific.

In 1891 the first British Resident arranged for an Elective Federal Parliament for the Cook Islands so that laws could be made for the whole group. Each island, however, continued to be self-governing in purely local affairs. In 1901 the islands formally became a part of the Dominion of New Zealand subject to the Cook Islands Government Act. The Act provided for the constitution of the Island Councils, for the establishment of public schools, courts of justice, and native land courts.

The trade of the Cook Islands is not great and is carried on primarily with New Zealand, though Great Britain, the United States, and Australia have a share in it. Neither are the islands of great strategic value, though the scattered islands to the north—particularly those in the neighborhood of Fanning and Palmyra—will play a part in the development of the Pacific air routes that will undoubtedly be out of all proportion to the size of these trifling bits of land. Even now they form vital links on the air routes from Hawaii to Samoa, New Zealand, and Australia, and play a part, by means of airplanes of wide-cruising radius, in protecting the supply routes connecting America and Australasia.

CHAPTER FIVE

Samoa and Her Neighbors, Tonga, Tokelau, Phoenix, and Kermadec

THE SAMOA ISLANDS occupy much the same position to the northwest of the Southern Cook Islands that the Society Islands hold to the northeast. Lying 700 miles northwest of Rarotonga, and 1,200 miles west by north of Tahiti, this 350-mile chain is made up of fourteen islands, only six of which are of importance. Savaii, Apolu, Tutuila, Tau, Ofu and Olosega are, in the order of their size, the important members of the group. The lesser islets are Manono, Apolina, Fanuatapa, Namua, Nuutele, Nuulua, and Aunuu, with the little coral island Rose the easternmost by 70 miles. Swains Island, which is not really a part of the group but is administered from Tutuila, lies 200 miles to the north. Except for Rose and Swains all the islands are of volcanic origin.

Though these islands, with the exception of Swains, are properly in a single archipelago, they are divided politically. The eastern islands (and Swains) are under the flag of the United States, and the western are under the administration of New Zealand.

American (or Eastern) Samoa

The Samoa islands that are under the protection of the United States are Tutuila, the Manua group (Tau, Olosega, and Ofu), Aunuu, Rose, and detached Swains. Of these, Tutuila is by far the most important.

About 25 miles in length, very irregular and from 1 to 5 miles in width, Tutuila is made up of a broken mountain range with many deep valleys which are extremely fertile. The western end of the island is broad, the central portion is almost cut in two by excellent Pago Pago Harbor, and the long northern side is rough and precipitous. The main villages are located on the more level sections of the western end and along the south coast, and the population on the abrupt northern side is small.

The whole island, even to the tops of the peaks, is densely wooded, and is very beautiful. Near the center of the island, only about a mile southwest of the U. S. Naval Station on Pago Pago Harbor, is Mt. Matafao with an elevation of 2,141 feet. North across the harbor from the Naval Station, Mt. Alava is 1,600 feet high, and $2\frac{1}{2}$ miles east across the harbor Mt. Pioa reaches an elevation of 1,700 feet.

The irregular coast line of the island has several other harbors, but that of Pago Pago is one of the finest among all the islands of the South Pacific, though it is considerably smaller than Pearl Harbor in Hawaii. It is located about the middle of the island, on the south side, and is about a mile wide, though coral reefs fringe the entrance shores and narrow its usable area. About a mile inland the harbor is widened by a western arm which narrows to a point at its end, where the town of Pago Pago is situated. Halfway along the southern shore of this arm of the harbor is the U. S. Naval Station. Seven or eight villages are dotted about the harbor, mostly on the northern side.

The population of Tutuila is just under 10,000 but is increasing, and the land is principally in the hands of the natives.

The little island of Aunuu, with an area of about one half a square mile, is situated about a mile southeast of Tutuila's eastern end.

Sixty-five miles directly east of Tutuila are the three

Manua Islands—Ofu, Olosega, and Tau. Ofu and Olosega are separated by a channel so narrow as hardly to separate them at all, and though Ofu is somewhat the larger of the two, they may be considered as one. Together these two coral-fringed islands are no more than 4 square miles in area. In 1866 a submarine volcano just a little way offshore from Olosega erupted and blew rocks and mud 2,000 feet or so into the air, but no serious damage was done. Both islands are broken and mountainous but are fertile and picturesque. Ofu reaches an elevation of 1,587 feet and Olosega has a peak 2,095 feet high.

Tau lies across a $6\frac{1}{2}$ -mile channel east-southeast of Ofu and Olosega. Approximately 6 miles east and west and 2 to $3\frac{1}{2}$ in width, its area is about 14 square miles. Two forest-clad peaks near its center—Lata and Olomatimu—reach elevations of 3,056 and 2,961 feet respectively, and the southern and eastern sides of the island are precipitous. The slopes on the northern and western sides are gentler. The eastern and western ends are fringed with coral, and the island has a good anchorage at its northwest corner where Faleasau Bay indents the coast, and where there is a village of the same name. Nine or ten other villages dot the western, northern, and eastern coasts, but none are to be found on the south side of the island owing to the steep rise from the water's edge to the island's two major peaks.

The population of all three of the Manua Islands is only about 2,500, the majority of whom are native.

Rose Island lies 70 miles east of Tau and is merely a small, uninhabited coral islet on which a few coconut palms grow. Swains Island (which is sometimes called Olosenga and sometimes Gente Hermosa) lies about 200 miles directly north of Tutuila. Formerly regarded as a part of the British-held Gilbert and Ellice Island Colony, it was transferred to the United States when, in 1926, these groups were included in New Zealand's Western Samoa adminis-

tration. The island is 3 miles long and 1 in width and has a population of about 125. Many of these are the descendants of a certain Eli Jennings who, in 1870, married the daughter of a Samoan chief and settled on the island.

On all of these American-held islands the natives raise the products usual in this area of the South Seas. Coconut palms and breadfruit trees are especially productive, and there are at least 16 varieties of the one and 20 of the other grown on the islands. Practically all tropical and subtropical fruits and vegetables are grown, but aside from copra little of this produce is exported.

The total population of American Samoa, exclusive of the personnel of the U. S. Navy, is in the neighborhood of 13,000.

Western Samoa

That portion of the Samoa Islands which is under the control of New Zealand consists of the two large islands of Savaii and Apolu, together with the six little islets of Apolina, Manono, Fanuatapa, Namua, Nuutele, and Nuulua. Apolina and Manono lie in the 10-mile strait that separates Apolu from Savaii and the four remaining islets all lie within 3 miles of Apolu's eastern end. Manono, with less than 1 square mile of area, is the largest of the islets, none of which are of importance.

Savaii and Apolu, however, are the largest islands of the entire Samoan archipelago, and Apolu, the lesser of the two, lies some 38 miles west by north of Tutuila. Apia, the administrative center and chief town of Western Samoa, lies on a good harbor on the northern side of Apolu.

About 46 miles from east to west, and 430 square miles in area, Apolu is irregularly oval in shape, its greatest width being nearly 16 miles. It is very fertile but, like Tutuila, has a thickly forested mountain range running its full length. Five peaks in this range reach or surpass 2,000

feet, and one—Mt. Vaaifetu, which lies about 9 miles south-east of Apia—has an elevation of 3,608 feet. At the western end Mt. Tafua, an extinct volcano which still possesses a crater, reaches 2,194 feet.

Most of the shore line of Apolu is coral-fringed but its coast is much indented and, in addition to Apia Harbor, there are many bays and anchorages. The island's villages lie mostly on or near the shore, but most of them lie on the northern side of the island. The central portions of the island are steep and elevated. The coastal portions are low and undulating with dense tropical vegetation everywhere, with palms and ferns and creepers thick.

Much the same appearance is presented by the larger island of Savaii, which is 45 miles in length and 26 miles in greatest breadth. The area of this island—703 square miles—exceeds that of any other island in all the thousands of miles of eastern Polynesia, though there are islands to the west and in Hawaii that are greatly larger. Its mountain ridge, too, is elevated, with Mt. Mauga Sili, close to the island's center, rising to an elevation of 6,094 feet. Five miles west of Mauga Sili is a crater that erupted last in 1750, but 6 miles to the northeast is the crater of Matavanu which, in 1906, burst forth with a lava flow that lasted for several years and reached the sea on the island's northern coast.

A low coastal strip entirely surrounds the island, but it is widest on the southern side and the eastern end. The island's coral reefs are mostly to be found off the broad eastern end. Villages to the number of 30 or more are scattered all about the shore line, with none of any size in the interior. The same dense tropical vegetation that appears on Apolu covers everything on Savaii except the more recent lava flows, two of which are large and come down the slopes to the northern coast.

The population of Western Samoa is about 57,700, of which 400 or so are European while about 3,000 are part-European. Apia, on Apolu, is the most important town, but, as is the case with most of the larger towns throughout all this section of the Pacific, it is very much Europeanized. Its harbor is small and is open to gales from the north. Furthermore, it is lined with coral reefs upon which, in 1889, a dozen ships, five of which were American and German warships, were wrecked in the exceptional hurricane of that year. In no sense is Apia Harbor to be compared with that of Pago Pago.

The climate of the whole of the Samoa archipelago is moist and sometimes oppressively hot. Most of the time, however, it is pleasant, and from April to September is especially so. A wet season extends from October to March, and December is likely to be the warmest month, with temperatures above 80 degrees. July is apt to be the "coldest," though even then the average temperature is usually in the seventies. The prevailing winds are the southeast trades, and these temper the heat, but from January to March the trade winds are interrupted and westerlies prevail. This, also, is the hurricane season.

The forests of Samoa contain many more varieties of trees than do those of the islands farther east, and are especially remarkable for the luxuriance and number of their tree ferns, creepers, and parasites. The island of Savaii has the best hard wood trees and it is from these that the natives have usually made their best and largest canoes. Coconut trees thrive especially well and copra is the archipelago's principal commodity for export. Taro, breadfruit, pine-apples, oranges, bananas, and yams are also grown commercially but play a small part in export. In American Samoa the government handles the copra crop for the na-

tives and even taxes are sometimes paid in copra. Nearly 70 per cent of American Samoa is forested, and in Western Samoa the percentage is about the same.

The indigenous fauna of the islands is limited and consists of no more than a rat, four species of snakes, and a few birds. A ground pigeon (*Didunculus strigirostris*) with iridescent greenish black and bright-chestnut plumage is a relative of the extinct dodo which formerly lived on the island of Mauritius in the Indian Ocean.

The Samoans are pure Polynesians and are unequaled in appearance by any Pacific islanders except the Maoris of New Zealand, the Tahitians, the Marquesans, and the Hawaiians, to all of whom they are closely related. Samoan is the most archaic of all the Polynesian dialects, but many of its words are easily traceable throughout large sections of the Pacific. The name of the island of Savaii, for instance, is, with modifications, widely in use. In time and in widely separated places it has become Havaii, Havaiki, Hawaiki, and Hawaii. The Hawaiians' "aloha" is the Samoan's "talofa," and many other words are similarly related. Their language is soft and has been called "the Italian of the Pacific."

Samoans are light brown in color, of splendid physique, and are regular in feature. The men are tall and, as a group, they are honorable, generous, and hospitable. Simple and ordinarily friendly, they nevertheless are brave fighters. Prior to the coming of the white men they were polytheistic, indulged in no human sacrifices, and believed that their dead reached a hereafter by way of a pool at the western end of the island of Savaii. Women and children were well treated, and tattooing was so important to them that a youth was regarded as ineligible for marriage until he had been tattooed from the hips to the knees. The promiscuous

sexual practices obvious in Tahiti and elsewhere never had such free expression in Samoa.

The Samoans in their native state indulged in an elaborate courtliness which found expression in the creation of what amounts to an entirely separate dialect that was used in the presence of "noblemen." The common names for almost every object were taboo in the presence of the "aristocracy" and special words were used instead. Such individuals were born to their positions but, despite the respect paid them, they could maintain their positions only "during good behavior," so to speak, and actually such positions as they held were elective—or at least were held by the consent of the others. Unlike the Hawaiian chiefs, who were ordinarily addressed by their given names, the Samoan chiefs had official names that were invariably used.

Fine dress appeals to the Samoan, and they are very fond of singing. Dancing, fishing, swimming, and oratory are all popular. Originally, courtship was carried on by proxy. Property was vested in the family, not in the individual.

Samoa was discovered in 1722 by the Dutch navigator Jacob Roggeveen, but apparently he saw only the Manua Islands. Louis de Bougainville found the archipelago in 1768 and named them the Navigators' Islands, a name that is still used by some mapmakers. In 1830 Christian missionaries arrived and not long thereafter Americans and Germans were attracted by the potentialities of the islands. In 1878 the United States, by a treaty with the natives, obtained Pago Pago as a coaling station, but within ten years, as a result of civil war between two rival kings, the United States and Great Britain found themselves energetically opposing the "strong" position taken in the matter by Germany. It was because of this development that British, American, and German warships were at anchor in Apia

Harbor before the destructive hurricane of March, 1889. The Germans, pressing their point, had been fighting the natives. The British and the Americans supported the native contender whom the Germans opposed. In the midst of this the hurricane struck, sinking the German and American ships. The one British ship present escaped, and one of the American ships was salvaged. Following this a treaty was signed in Berlin in 1889 guaranteeing the independence and autonomy of the islands. Ten years later, as a result of another civil war over the succession to the throne, the Berlin treaty was abrogated, Great Britain withdrew, and the archipelago was divided between the United States and Germany. During the First World War the German holdings were taken by Great Britain and, in 1920, these were assigned under mandate from the League of Nations "to His Majesty the King, in right of his Dominion of New Zealand," which was empowered to govern Western Samoa.

Economically, insofar as the products of this archipelago are concerned, Samoa is of no great significance. Several thousand tons of copra a year make up the principal item of export. The harbor of Pago Pago, however, is of great importance to a fleet called upon to operate in the southern Pacific. And the islands are increasing in both economic and strategic importance because of their location on the direct route between Australia and New Zealand on the south, and Hawaii. Both ships and airplanes find in the Samoa Islands exactly the stopping place they need for the maintenance of service—commercial or military—across this section of the Pacific. Furthermore, Samoa is of great assistance in guarding the shipping route from the United States to Australasia.

Tokelau, or the Union Group

The Tokelau Islands, sometimes known as the Union Group, lie about 275 miles north of the Samoan island of

Savaii. There are only three of them, and altogether they have an area of only 6 square miles. They are three low-lying coral atolls, each with a lagoon, and are called Atafu, or Duke of York; Nuku Nono, or Duke of Clarence; and Fakaofu, or Bowditch. They lie in a row with Atafu at the northwest end and Fakaofu a little over 100 miles away at the southwest. Nuku Nono lies midway between these two.

Each of these atolls is made up of a number of islets on its oval reef, and about 1,000 Polynesians inhabit them. They speak a Samoan dialect, their chief village is on Fakaofu, and copra is their chief product.

The Phoenix Islands

Seven hundred miles due north of Samoa, 4 degrees south of the equator and 172 degrees west of Greenwich, lie the eight small British-controlled islands of the Phoenix group. All of them are low-lying coral atolls, each enclosing the usual lagoon, and seven of them—Canton, Enderbury, Phoenix, Sydney, Hull, Gardner, and McKean—form an irregular oval almost 200 miles in length, while the eighth—Birnie Island—lies within the oval near its eastern side.

Canton, or Mary Island, is an atoll, 8 miles by 4, surrounding a lagoon of almost these same dimensions. The limited land areas of the islets are covered with stunted vegetation except at the southern end where a few coconut palms grow.

Enderbury is a similar atoll, 3 miles by $1\frac{3}{4}$. Phoenix is much larger, its islets having a total area of about 3 square miles, though its lagoon is not greatly different in size from Canton Island's.

Sydney, McKean, Hull, and Birnie are all much smaller, while Gardner is horseshoe shaped and more fertile than the others. Because of its fertility the coconut palms are more abundant.

There is no indigenous population on these islands, but a few hired Polynesians are kept on them to tend the coconut crop.

About 350 miles to the northwest lie the two similar, though smaller, little atolls of Howland and Baker, and these two are the property of the United States. In 1938, American officials were also placed on Canton and Enderbury in order to establish a claim to these two larger atolls, for despite their limited size these small islands are valuable as mid-ocean airplane bases, whether for commercial or military uses. The British, however, at first wished to maintain their sovereignty on Canton and Enderbury, though later the same type of co-operative control as is in effect on Christmas Island was successfully worked out.

A fine three-way airport has been established by the United States for several years on Howland Island, which was the mid-sea dot toward which Amelia Earhart was flying from New Guinea when she was inexplicably lost.

The Tonga, or Friendly, Islands

Nearly 300 miles south of Western Samoa and a little to the west lies the first island of a numerous archipelago that stretches for another 200 miles to the south. These are the Tonga, or Friendly, Islands, a strange collection of about 150 islands and islets, most of which are uninhabited, but a few of which are of mild importance and some interest.

The archipelago is divided into three clusters, the northernmost of which is the Vanau Group. The central cluster is the Haapai (or Haabai) Group, and the southernmost make up the Tongatabu Group. Altogether these three groups total only 300 square miles or a little more.

Along the western side of the northern half of the chain lies a line of volcanic islands, and much volcanic action is still occasionally in evidence. These islands are inclined to

be high, but the others, being of coral, are, for the most part, low and level, averaging no more than 40 feet elevation, though some have hills that reach 1,000 feet. The sides even of these low islands are often steep.

The northernmost, or Vanau Group, is made up of the main island of Vanau and about 30 little islets of varying sizes. Vanau itself is amazingly irregular with a dozen or more protuberant capes especially on its southern side. It is the second largest island in the entire chain, is about 55 square miles in area, and nowhere exceeds 300 feet in elevation. Neiafu, on a long, irregular, and landlocked harbor that penetrates the island on its southern side, is the principal town of the northern group. The islets that make up the rest of this northernmost cluster lie mostly to the south and southwest within 10 or 12 miles of Vanau, and present a series of complicated hazards in the path of any ships attempting to reach Neiafu Harbor.

The vegetation of this group is somewhat luxuriant, but scenically these islands offer very little. The population of this cluster is about 8,000. As is not uncommon among islands of raised, coralline structure, Vanau has many caves.

About 40 miles west by south of Vanau is the small circular island of Late. It is uninhabited and is a dormant volcano with an elevation of 1,700 feet.

Some 60 miles south of Vanau lie the first of the Haapai Group, which is scattered over an area about 70 miles north and south and nearly 50 miles wide. Mostly of coralline formation and scattered most irregularly in the midst of a region largely made up of coral reefs, about 50 islands and islets are to be found in this cluster. The largest is Tofua, a volcanic island some 3 miles in diameter. It reaches an elevation of 1,700 feet and in its large crater is a lake. For many years it has shown no extreme activity but smoke comes from vents near its summit. Lieutenant Bligh and the men with whom he escaped in a small boat from the *Bounty*

when the mutineers took the ship in 1789 landed on Tofua to obtain water while they were on their 3,000-mile voyage to Timor, but they were driven off by the natives. The island is now uninhabited.

The islands of Haano, Foa, Lifuka, and Uiha are the most important of the Haapai Group, and they all lie in a ten-mile string at the northeastern extremity of the group. Kotu, near the center of the group, and Nomuka, near the southern end, are slightly larger than the tiny islets that surround them. The only considerable village in the cluster is Pangai on the island of Lifuka.

The population of the group is about 6,000 and except for Tofua and the lesser near-by island of Kao, an almost perfect cone, which, for an island less than a square mile in area, reaches the surprising elevation of 3,380 feet, all of them are low. They are, however, unusually fertile for coral islands, the surface being covered with a rich mold on a substratum of clay. The soil is consequently productive, but ground water is scarce and bad.

The final southern cluster of the Tonga Islands is known as the Tongatabu Group and is made up of the archipelago's largest island, Tongatabu, and the island of Eua which lies about nine miles to the southeast. In addition there are a dozen or so tiny little offshore islets.

Tongatabu is triangular with its 20-mile northern side broken into by a coral-strewn lagoon about 4 miles wide. At the western side of this bay lies Nukualofa, the capital of the archipelago and its most important town.

Tongatabu (or Sacred Tonga) is a little over 100 square miles in area, but the land seldom rises above 60 feet. Thus, despite the luxuriant vegetation, there is little that is striking in the island's appearance. Nukualofa is an attractive little town with streets of turf, and with all its structures—public buildings and private dwellings—set among heavy growths of tropical trees and flowers. Near the town in the

island's coralline edge are the famous "blow holes" which, as the surf pounds in against the shore and finds its way through passages in the rock, spout 50 or 60 feet into the air like geysers. Not far from the town is the "Wood of Bats" where thousands of "flying foxes," the large fruit-eating bats of this part of the world, hang upside down all day before flying out in the evening and feeding on the fruit crops. These animals are sacred in the eyes even of Christianized natives.

Eua, 9 miles to the southeast of Tongatabu, is only one third the size of the larger island but reaches an extreme elevation in a hill 1,030 feet high. It formerly supported a large population but civil wars long ago drove them out and only about 400 now occupy it. These, together with the population of Tongatabu, total nearly 15,000.

Near Tongatabu is Falcon Reef which, several times, has appeared above the water as the result of volcanic disturbance only to be washed away or to subside. In 1886 it discharged pumice and scoriae to form an island 50 feet high, but within twelve years it was gone. Then, in 1900, a solid core of black rock rose 6 feet above the water at this point.

The uninhabited island of Ata lies 85 miles south-southwest of Tongatabu. It is small but reaches an elevation of 1,165 feet, and the twin peaks of which it is made are extinct volcanoes. Some guano deposits are on the island but there is no harbor and the deposits are undeveloped.

The climate of the Tonga Islands is healthful and, compared with that of Samoa, dry and cool. Temperature changes are frequent and noticeable but not extreme. Cool southeast trade winds blow strongly, sometimes almost violently, from April to December. During the rest of the year the winds are from the west-northwest and the north with rain and occasional hurricanes, though devastating gales are rare. The rainfall for the year is about 80 inches and the

mean average temperature from April to December is in the seventies, though it is higher in the rainy season.

The vegetation is more nearly like that on the islands farther to the west than like that on Samoa, but it includes all the plants that are found on islands to the east. Tree ferns, some of which are peculiar to these islands, are numerous, and all the usual fruit trees known in the islands of this portion of the Pacific are grown. Coconut palms grow in profusion and copra is the leading commercial product. Breadfruit, oranges, bananas, and a wide variety of other fruits are grown, but mostly for local consumption.

The only indigenous mammals are a small rat and several species of bats. About thirty species of birds are known, an owl being the only bird of prey. There are great numbers of parrots, pigeons, kingfishers, rails, honeysuckers, ducks and other water birds. There are a few snakes and lizards but no toads or frogs. Except for ants, beetles, and mosquitoes, insects are rare. Many species of fish, including turtles and sea snakes, are to be found, and molluscs abound.

The natives are Polynesians, probably with an infusion of Fijian blood. Their appearance and their language show them to be closely related to the Samoans, but they are somewhat more energetic. On the other hand, certain names of places and traditions suggest a relationship with the people of the Fiji Islands.

Crime is infrequent, and the morality of the Tongans has always been better than that in most of the islands of Polynesia. The people have strict ideas of etiquette and pay great attention to gradations in rank. In this they resemble the Samoans.

Tongans are friendly and courteous, lively and inquisitive, although at times they have been somewhat arrogant and inclined to steal. They are brave and energetic, but

the ease of life in their islands does not encourage industry. They are fond of children, have seldom practiced infanticide, and cannibalism was rare. Women are treated considerably and perform only the lighter work. Primarily farmers, they are competent sailors and fishermen. Their trades, such as boatbuilding, netmaking, and carving are hereditary. In contrast to their houses, which are not sturdily constructed, the surrounding grounds as well as roads and village streets are carefully and attractively planned and cared for.

The islands were discovered by Jacob Lemaire and William Cornelius Schouten in 1616. Captain Cook visited the islands in 1777 and, because of the friendliness of the natives, called the archipelago the Friendly Islands. He did not know that several chiefs planned to kill him and his crew and seize his two ships. The plan fell through because of the inability of the chiefs to agree upon the time of the attack.

Missionaries began their work in the islands in 1823 and by 1850, after a religious war had been fought, heathenism was almost gone.

The archipelago is a constitutional monarchy and a native queen—Dame Salote—is on the throne, but under a treaty negotiated in 1900 a British agent and consul acts as adviser to the queen and the government. The agent is deputed by the High Commissioner and Consul General for the Western Pacific at Suva, Fiji Islands.

The resources of the Tonga Islands are limited and are identical with those of near-by island groups. Only copra is of importance in the archipelago's export trade. Furthermore, the islands have not benefited by being near the trade routes of the western Pacific, for Samoa and the Fiji Islands are more important and have attracted those routes to themselves. With the development of commercial trans-

oceanic airways, the Tonga Islands may increase in importance, though it is likely that military aviation will continue to revolve about Samoa and Fiji rather than Tonga.

About 425 miles south and a little west of the most southerly of the Tonga Islands lies a tiny little group called the Kermadec Islands. There are only five of them, and of these only one—Sunday Island—is of any size. This one is 7,200 acres in extent—about 11 square miles. The others are Macauley Island, 764 acres; Curtis Island, 147 acres; the Herald Group, 85 acres; and L'Esperance (French Rock), 12 acres. They lie in a line running almost due north and south, with Sunday (or Raoul) Island farthest north, Macauley coming next, and Curtis third. The Herald Group of closely associated rocks follows these and L'Esperance is last, 175 miles south and a little west of Sunday Island.

They are volcanic in origin and some thermal activity is still in evidence on Sunday Island, which is triangular, thickly wooded, and reaches an elevation of 1,723 feet. It is fertile and it should be possible to raise almost any tropical or subtropical plants there. It has four interior lagoons, two of which contain fresh water, but otherwise surface water is rare.

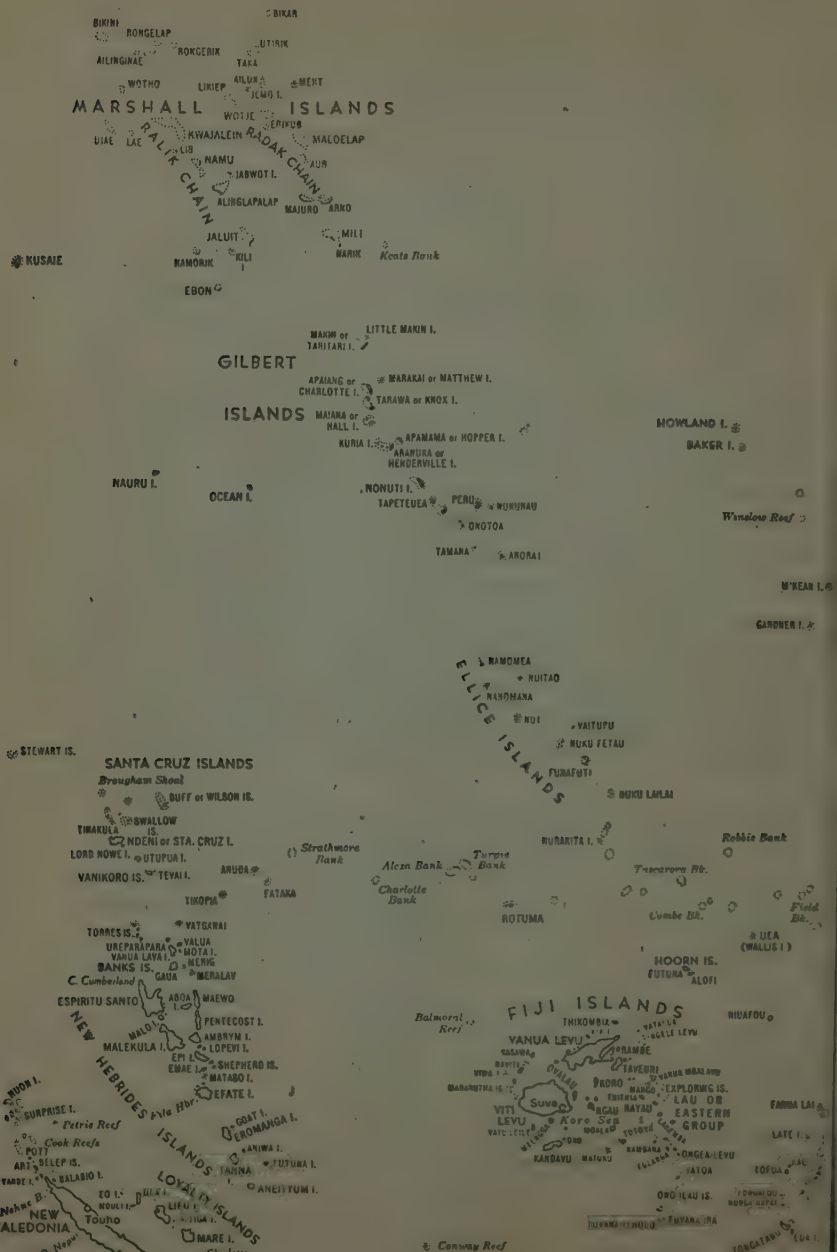
Formerly whalers called at Sunday Island for water, but except for several unsuccessful attempts at colonization, the islands have always been uninhabited. It is not unlikely that transoceanic air lines may find a use for the Kermadec Group, for they lie on the direct line between New Zealand, Samoa, and Hawaii.

CHAPTER SIX

The Fiji Islands, the Ellice Islands, and the Gilberts

FOUR HUNDRED MILES southwest of Western Samoa and nearly 250 miles west of the northernmost Tongas, lies the great archipelago of the Fiji Islands. In the area of ocean over which it is scattered it is greatly smaller than any of several Pacific archipelagoes, for it lies within a rectangle only 325 miles east to west and 225 from north to south. But it is made up of about 250 islands, two of which are comparatively large, and, with 7,435 square miles of land area, it forms an important island group. On the other hand, many of the islands are trifling in size and only 80 are inhabited. Of these 80, only 30 are more than 5 square miles in area. These 30 are listed below in order of their size:

Viti Levu	4,053 sq. mi.	Naviti	13 sq. mi.
Vanua Levu	2,128 sq. mi.	Beqa	13 sq. mi.
Taveuni	166 sq. mi.	Yadua	12 sq. mi.
Kandavu	165 sq. mi.	Lakemba	12 sq. mi.
Yasawa		Matuku	11 sq. mi.
Group	90 sq. mi.	Ono (-i-ra)	11 sq. mi.
Koro	58 sq. mi.	Totoya	11 sq. mi.
Ngau	45 sq. mi.	Mango	10 sq. mi.
Ovalau	43 sq. mi.	Thithia	10 sq. mi.
Moala	28 sq. mi.	Nairai	10 sq. mi.
Rambe	27 sq. mi.	Laucala	9 sq. mi.
Quamia	26 sq. mi.	Kia	9 sq. mi.



Vanua		Naitamba . . .	9 sq. mi.
Mbalavu . .	24 sq. mi.	Kanathea . . .	8 sq. mi.
Vatu Leile . .	18 sq. mi.	Nakogai	5 sq. mi.
Rotuma	14 sq. mi.	Batiki	5 sq. mi.

These spellings, incidentally, are not invariably followed. The task of using our alphabet in setting down Fijian names is not a simple one, and various spellings are frequent. Sometimes, too, these differ considerably, as when Ngau is spelled Gau, or Quamia is spelled Nggamia, or Laucala is set down Lauthala. Thus spellings used by different mapmakers differ and, in addition, some of the islands have two or more names, a fact which becomes obvious when various detailed maps of the archipelago are compared.

Viti Levu

The island of Viti Levu is by far the largest of the group and save for a fringe of tiny islands just off its west coast and the small Yasawa chain 30 miles to the northwest, is the westernmost island of the archipelago. Roughly oval in shape, it is 90 miles east and west by 65 north and south.

The island is mountainous throughout the interior, and there is not much level country, though there are considerable areas of undulating land. The richest agricultural lands are in the coastal regions and along the rivers, five of which are large and flow from the deep interior. These river valleys, and especially the deltas at the mouths of the greater streams, are often flooded and though this process aids the fertility of the land, crops often suffer damage or destruction.

The Rewa River is the greatest on Viti Levu, and has created a delta some 12 miles across at the southeastern side of the island. Here, through four main mouths, the river reaches the sea. The other important rivers are the Nauua, the Singatoka, the Nandi, and the Mba. The Mba, the Singa-

toka, and the principal tributary of the Rewa all rise within 7 or 8 miles of each other on the slopes of 4,341-foot Mt. Tomanivi in the north central portion of the island, and though the three follow parallel courses for a little way down the mountain, they then choose different directions, and the Rewa reaches the coast on the southeast, the Singatoka on the southwest, and the Mba on the northwest.

Looking across these and other river valleys are more than twenty mountains of 1,200 to 4,300 feet elevation. The four most important are Mt. Tomanivi in the north, Mt. Kuramba, 3,528 feet, within 10 miles of the west coast, Namosi Peak, 3,027 feet, 12 miles inland from the southeast coast, and Mt. Muanivatu, 3,709 feet, close to the island's center.

The island is luxuriantly covered with vegetation even to the tops of the highest mountains, and the many plantations raise practically all the usual tropical fruits and vegetables, in addition to cotton (less now than formerly) coffee, sugar cane, arrowroot, and cinchona. Copra and sugar are important exports.

Suva, the capital of the Fiji Islands Colony, is on the southeast coast of Viti Levu, some 5 miles west of one of the mouths of the Rewa River. It is an attractive town of about 15,000, less than a quarter of whom are white. It is located on the western side of a 3-mile peninsula which, with another 3 miles to the west, forms Suva Harbor. The wide mouth of the harbor is almost closed by a coral reef through which the funnel-shaped Levu Passage permits access even for large ships.

The bright-green hills behind Suva rise several hundred feet, and the town, which originally lay close to the water front, has now spread up the slopes for a mile or so. Near the landing is an open-air bazaar, and Victoria Parade, which is lined with weeping fig trees and acacias called "rain trees," leads past the city's famous Botanical Gardens

to Government House and the near-by native village of Nasese.

The residences of the town are bungalows, surrounded by trees, shrubs, and flowers of luxuriant growth and exotic form. Red, white, violet, and yellow hibiscus, golden allamanda, purple bougainvillea, scarlet and yellow climbing lilies, deep-yellow and orange cannas, fragrant gardenias, and a profusion of vivid foliage plants and flowering trees and shrubs are everywhere, even about the business structures of the town. The town is always warm, the colors bright, and the sunshine vivid.

Elsewhere on the island there are many native villages, but only a few towns of any significance. Lautauka and Mba, on the northwest coast, are sugar towns, Nausori, in the Rewa delta, is an agricultural center, and Singatoka, at the mouth of the river of that name, is the island's southwest port. A motor highway encircles the island and connects Suva with these and other towns and villages. Interior communications are less well developed.

On the eastern coast just north of the Rewa delta is the old native capital of Mbau. It is on a tiny island which, at low tide, is connected with the main island by a narrow coral causeway. Today Mbau consists of only a few bungalows and a cluster of thatched native cottages. Near the site where the chiefs had the ovens wherein were cooked the endless human victims that went to satiate their craving for human flesh stands the only remaining tree that once made up a part of the so-called "sacred grove." Its trunk is covered with countless "notches" that served as a tally of those who were killed and eaten. The rest of the sacred grove, when cannibalism was put down, was destroyed in order to aid in the elimination of the horrible native superstitions.

The other islands close about Viti Levu's shores are, with one exception, quite unimportant. Mbengga, however, an

island 2 miles in diameter, which lies 4 miles to the south, and reaches an elevation of 1,450 feet, is interesting because of a fire-walking ceremony that is similar to that of the island of Raiatea in the Society Group.

Vanua Levu

The second of Fiji's two greatest islands is Vanua Levu which lies 36 miles northeast of Viti Levu. About 112 miles in length, it is narrower than Viti Levu, and greatly more irregular in outline. Its extreme northeastern end is a long thin point, and nowhere does the main body of the island exceed 25 miles in width, but halfway down its southeastern side a thin isthmus connects it with a 35-mile-long peninsula. This lies roughly parallel to the island's northeastern half and is itself surrounded at its end by a cluster of islands, one of which—Taveuni—is the third largest of the Fijis.

Vanua Levu has no regularity either in form or feature except that the hills and mountains tend to line the coast, leaving much of the narrow interior only a few feet above sea level. Far in the interior, too, coralline debris is strewn about despite the fact that the island is predominantly volcanic in construction. There are many thermal springs with water temperatures of 100 to 210 degrees Fahrenheit.

At the southwestern end Mt. Seaturu (or West Peak) reaches an elevation of 2,760 feet and is lined with radial gorges where sandalwood trees grow. In the central portion of the island there is a large, arid rolling plain whose vegetation is scanty and stunted. The soil of this plain is dry and crumbling and the natives call it the "telasinga" or "sunburned land." Near Seaturu lies a plateau about 5 miles wide and 800 feet high at the southern edge of which picturesque Na Savu-ni-muku Falls drop nearly 150 feet. Mt. Thurston, 3,134 feet, is the highest peak in the eastern portion of the island, and 2,000 feet up its sides are the Tal-

oku and Dromo caves, wherein quantities of edible birds' nests are found. Here and there about the coast are deep gaps containing tidal rivers and mangrove swamps. There are fully forty rivers, one of which is about 50 miles in length, and near Wai-ni-koro is a small lake which is regarded by the natives with awe because of three floating islands that it contains. These islands are composed of dense growths of swamp ferns, reeds, and sedges, and they support small trees from 10 to 20 feet in height. Apparently they normally rest on a rocky substratum, float clear when the water level is increased, and then drift around because the trees act as sails.

The island has innumerable harbors, but the population is comparatively small, for, large though the island is, Vanua Levu is far less fertile and productive than Viti Levu. Villages are few, and only Valethi and Nambouwalu on the south coast and Nanduri and Lambasa on the north are of any size. Natewa Bay, which lies between the big northeastern peninsula and the main body of the island, is almost 40 miles long, 4 to 8 miles wide, and is called the Dead Sea by the natives. The isthmus which stands at the end of this bay and connects the big peninsula with the island is so low and narrow that natives can drag their canoes across in half an hour or so, and so can save the long trip around the 40-mile peninsula.

Taveuni Island, which is the third in size in the entire group, lies 2 miles to the southeast of Vanua Levu's big peninsula. It is about 28 miles in length by 2 to 3 in breadth and is a single unbroken ridge which reaches an elevation of 4,070 feet in Mt. Ulu-i-ngalau. This island is crossed by the 180th meridian of longitude and is thus exactly halfway around the world from Greenwich, England. Waiyevo is the only village of note, and it lies on the side facing Vanua Levu. The island is luxuriantly wooded and heavy rains fall

on its ridge. It is more productive than the larger adjacent island, and fruits, vegetables, coffee, sugar cane, arrowroot, cinchona, cotton, and coconuts are raised.

To the east of Taveuni and thence to the north and all about the northern and northwestern coast of Vanua Levu are scores of little islets and coral reefs. The islands of Quamia and Rambe, however, are the only ones of any size. Both of these lie within 5 miles of Taveuni's northern end.

Stretching parallel to Vanua Levu's northern coast is an extended coral reef which, after it runs west for about 150 miles, swings to the south north of Viti Levu and creates the 50-mile chain of the Yasawa Group, sometimes called the Ono, Ba, or Leeward Islands. These lie in a line from the northeast to the southwest, and, counting all the uninhabited rocks and islets, there are scores of them. Only five, however, are worth mentioning by name. From north to south they are Yasawa, Nathula, Yanggeta, Naviti, and Waya—Naviti being the largest. Except for Waya none of these is elevated, but Waya reaches an elevation of 1,870 feet. Formerly, even among the wild Fijian tribes, the tribesmen of this island had an especial reputation for ferocity.

Lying east of the great island of Viti Levu, is a scattering of islands called Lomai Viti, or Middle Fiji. A dozen of them are of some size. Of the larger ones, Ovalau, 6 miles east of Viti Levu, is the most important. Its chief town, Levuka, was the British capital of the colony until 1882, and the island is very picturesque. High and rugged, its 3,000-foot central peak is cut with gorges and sharp with crags. About 7 miles by 8 in size, it was formerly heavily forested, but the trees have been largely cut away and now many of Fiji's white population have homes there. There is little level ground and the valleys are short, but there are several good anchorages, for the island is reef surrounded and there is a lagoon.

Thirty-five miles east of Ovalau is the 2-mile island of Nairai, where the best native baskets and mats are made. Five miles south of Nairai is the somewhat larger island of Ngau, also surrounded by a reef which, on the west especially, forms a large lagoon. Moala, 7 miles by 6 and 1,535 feet in elevation, lies 45 miles to the southeast and abounds in edible fruits and vegetables, but about it are to be found an unusual number of fish that are poisonous when eaten.

Thirty-five miles north of Ngau is the larger island of Koro, sixth in size in the whole archipelago. Ten miles north and south and 4 miles wide at its northern end, it tapers to a point at the south. Its densely wooded backbone ridge reaches a maximum height of 1,850 feet and, as early as 1880, it was productive of cotton, copra, arrowroot, and tortoiseshell. Now, however, its production has greatly declined and it is interesting principally because of its precipices and strangely shaped peaks, its native villages on seemingly inaccessible cliffs, and its deep ravines and waterfalls.

Southwest of Koro about 28 miles is the small island of Makongai where the British have established the important and thoroughly equipped leper station which is the chief one of its kind in the South Seas.

Fifty miles directly south of Viti Levu is the island of Kandavu, the fourth largest of the Fijis. About it, too, though especially to the northeast, are scattered many little islets, of which the principal one is Ono.

Kandavu is narrow and 38 miles in length. Near its center it is almost cut in two, at Tavuki Isthmus, which is barely above sea level and only a few hundred feet across. At its southwestern tip stands Mt. Washington, 2,750 feet, which, to the natives, is Buke Levu or "the great yam heap." The island has a steep central ridge and is fertile, but it has been neglected and is little developed. The little village of Vunisea lies on the low and narrow central isthmus.

Stretching for 150 miles north and south, the eastern islands of the Fiji archipelago form an intricate pattern about 50 miles in width, with the northernmost of them 50 miles east of Taveuni and the southernmost 150 miles east of Kandavu. Lying in a portion of the sea that is filled in every direction with crooked, irregular coral reefs between which lies passages both narrow and wide and upon which islets and islands in considerable numbers stand, there are, nevertheless, no more than thirty islands that deserve the name, and only six or eight of these are of any note.

Of these, Lakemba is one. Situated about midway of this maze of islets and reefs, it is a rounded volcanic island nearly 5 miles across and with several low peaks in its center. Its greatest elevation is 720 feet and its interior is poor, being covered with grass and "screw pines." The coastal belt is more productive and tropical fruits and coconuts do well there.

For centuries Lakemba was an important meeting place between the Fijians and the Tongans whose islands lie a little over 200 miles to the east, and by way of this island these two island peoples passed back and forth some of their ideas and customs. Missionaries, too, who went first to Tonga, reached the Fiji Islands by way of Lakemba in 1835.

Nayau, Tuvutha, and Thithia lie in a 20-mile triangle some 30 miles to the north of Lakemba, but contain nothing out of the way except Tuvutha's small lakes that are set high among the island's central peaks.

At the northern end of these easternmost Fijian islands is a little group that lies within a large triangular barrier reef. These are sometimes called the Exploring Islands, and only Vanua Mbalavu is of any importance. It is a long, narrow, crooked island about 15 miles in length but in no place more than 2 in width. Its northern half is broken and wooded, but its southern half is fertile and supports many

villages. Lomaloma is the chief village and lies near the island's southern tip.

Kanathea, Malata, and Mango islands lie to the west of Vanua Mbalavu and all are fertile and productive, but the other islands round about are smaller and are mostly mere islets. Twenty-five miles to the north lies Wailangi-lala, one of these lesser islands, but it is more important than the rest for it is marked by the lighthouse showing the way for ships to and from the east and north.

At the southern end of this eastern scattering are the three widely separated islands of Namuka, Kambara, and Fulanga. Kambara was formerly famous as the place of origin of the finest Fijian war canoes.

The Fiji Islands do not lie clearly in the regions of the southeast trade winds, and are well to the east of the monsoon belt. From April to November winds that are easterly blow steadily, and the climate is moderate and dry. As the warm season approaches, however, the winds shift to the north and the weather grows uncertain. In February and March gales are frequent and hurricanes occasional. Though the rainfall is much heavier on the windward sides of the major islands than to leeward, the differences in temperature are slight. In the hills the temperature sometimes drops to 50 degrees, but on the coasts the mean is near 80. From November to April the climate is enervating to white men, but it is not unhealthful. Fevers are hardly known, though dysentery, which is said to have been unknown until the coming of white men, is common.

The flora of the islands is related rather more closely to that of the great islands that lie much farther to the west than to that of the lesser islands to the east. The heavily forested areas are mostly thick jungles with large trees and heavy growths of creepers and vines. The lee sides of the larger islands, however, have grassy areas suitable for

grazing, with scattered trees, mostly pandanus, and ferns. Certain acacias are found on the islands, which show a relationship with the flora of New Zealand, New Caledonia, and Australia.

Of the palms the coconut is by far the most common. Sandalwood grows but has been largely eliminated. Many herbs are used by the natives in cooking and one (*S. anthropophagorum*) was one of several always used in the cooking of human flesh, which, according to the natives, was otherwise difficult to digest.

Many varieties of breadfruit are grown. Plantain, bananas, sugar cane, and lemons are important. Pineapples have been introduced, and edible roots are especially abundant. The chief staple of the natives is the yam, and they use no grain. A kind of bread is made of bananas and from taro and other roots. Breadfruit, too, serves a similar purpose. Growing sugar cane and manufacturing sugar are among the islands' most important activities, and copra forms a considerable portion of the islands' exports.

As with other south Pacific islands, the indigenous fauna of the islands is poor, and consists of only a few species of bats and rats. Dogs, pigs, and domestic fowls were introduced early by the natives, but not until the coming of white men were cattle, horses, goats, and better strains of swine brought in. Birds are not remarkable for their number or varieties. There are few birds of prey, but parrots and pigeons are common. Fish are numerous and of many species, both edible and poisonous. Molluscs, especially salt-water species, are plentiful, as are also crustaceans. The sea provides the natives with an important part of their food supply. Insects are common but few in number of species. Mosquitoes breed profusely.

The natives of Fiji are Melanesian (Papuan) in origin, though they have been much crossed with Polynesians from Tonga and Samoa. Perhaps this infusion of Polynesian

blood explains their physical superiority over the purer Melanesians farther to the west. Tall and well built, they are dark in color, their skin is hairy, their hair is crisp and black although it was formerly often bleached with lime and worn in elaborately trained fashion. Muscular and strong, their features are not unpleasant, though they are less attractive than the Samoans. Their eyes are deep-set and their beards bushy. The chiefs are fairer and more prepossessing than the more Negroid commoners, and the western portions of the archipelago support people more Negroid in appearance than the eastern. They combine, to some extent, the quick intellect of the Polynesian with the savagery and suspicion of their darker progenitors. Cleanly and particular of personal appearance, they care little for adornment and only the women are tattooed.

Excellent cultivators, carpenters, and canoe makers, these activities are hereditary. They make good pottery, excellent mats and baskets, and good nets, and their women are better treated than are those of the purer Melanesians.

Formerly they were notorious cannibals. Possibly this practice began with their religion, but if so the religious atmosphere was forgotten and cannibalism degenerated into gluttony. The Fijian chief's greatest table luxury was human flesh—"long pig," they called it. Even friends and relatives were frequently eaten. Their greed in this regard went hand in hand with their natural ferocity, and human sacrifices were an everyday affair. The wives and slaves of chiefs who died were buried alive with their deceased masters. In every hole dug for the posts that were to support a chief's house a slave was buried alive. The huge, heavy war canoes were first launched over the bodies of bound slaves who were crushed to death in the launching, and the old and sick were slain.

Despite this one-time brutality, the Fijians are a hospitable, generous, and courteous people. Sensitive and

proud, they are also vindictive. Boastful and vain, they are also good conversationalists. Their code of etiquette is elaborate, and rank is clearly marked.

Politically they formerly based everything on the family. Groups of families were, feudal-fashion, under lesser chiefs who, in turn, owed allegiance to greater ones. The chiefs formed a real aristocracy, for they were abler of intellect and superior in physique. A sort of religious reverence was felt toward these characters, and everything a person had belonged to his chief. The chief's property, however, in some sense belonged to the people.

In war the chief was absolute, and many formalities and courtesies were essential. They were competent in constructing fortifications, and fought with spears, slings, throwing clubs, and bows and arrows.

In irrigation they were competent, and long ago connected two channels in the Rewa River delta by a canal several miles long and 60 feet wide.

They are fond of amusements. Dancing, storytelling, and singing are popular. Their poets compose verse showing a marked meter and a near rhyme or assonance. Their music is crude. Their religion was a kind of ancestor worship mixed with certain Polynesian beliefs. Ndengei was the greatest of their gods, but he was thought to pay little attention to humans or their affairs. There were other gods, with whom, on a somewhat lower plane, stood the spirits of departed chiefs, heroes, and ancestors. The gods entered and spoke through the priests who were hereditary. Certain groves and trees were sacred, but idols were not in use.

Houses were frameworks of timber to support the thatch, and were beautifully ornamented, well furnished with mats, and protected by mosquito nets. Their handsome canoes were sometimes more than 100 feet in length.

Discovered first by Abel Tasman in 1643, the whole archipelago was not charted thoroughly until 1840. Up to

this time the evil reputation of the Fijians had kept Europeans from frequently entering the archipelago. Missionaries, however, began their work in the islands in 1835. Civil wars were common during the first half of the nineteenth century, and in 1859 a ruling chief, or "king," named Thakombau, offered the sovereignty to Great Britain. This was rejected, but further internal troubles brought the offer up again. Again refused, it was offered to the United States which also refused. Finally, in 1874, the British, who were again approached, accepted, and the British governor was made High Commissioner for the Western Pacific, and is responsible to the Colonial Office in London.

In 1878 coolies from India were first imported, and now they are about 40 per cent of the population, forming 89,333 of a total population of 205,397. About 4,300 white people and an equal number of half-castes are included in the total.

Cannibalism has long been eliminated, and the Fijian population is now increasing though about a quarter of the population succumbed to measles in the 1870's and in 1919 the deaths from influenza were heavy.

Commercially the Fiji Islands are more important than any of the archipelagoes to the east, but they have suffered economically at intervals ever since the American Civil War. Sugar is their most important product, but even that has had its ups and downs.

Lying directly to the north of New Zealand and on the direct route from Australia to Hawaii, these islands are also close to the direct line from Sydney, Australia, to the Panama Canal. Thus they are of real strategic value both in commerce and in war. With Samoa to the east and New Caledonia to the west they form powerful bases for the protection of the route between Canada and the United States on the one hand and New Zealand and Australia on the other. With these islands, Hawaii, and New Caledonia

firmly held, the lines of communication from America to Australasia are safe.

The Ellice and Gilbert Island Groups

Five hundred miles directly north of the Fiji Islands are the nine coral atolls that form the Ellice Islands, an irregular chain which extends toward the northwest for some 400 miles. About 250 miles to the northward of the most northwesterly of the Ellice Group is the first of the Gilbert Islands, a similar group of atolls, 16 in number, that run on to the north-northwest for roughly 400 miles. Here, with Makin Island, these two British island groups end, only about 150 miles south of the eastern end of the extensive Japanese-held Caroline Archipelago. Of the two groups the Gilberts are the more important, the atolls being more numerous, much larger, and more heavily populated.

There is little by which to differentiate one of these atolls from another, though there are considerable differences in their size. They are especially barren for islands of this type, and aside from taro and a few other food products, little or nothing but coconut palms grow on them, and copra is almost their only product. In spite of this the population of the Gilberts is surprisingly large, 26,340 natives inhabiting these 16 atolls.

The dimensions of the atolls that follow are apt to be misleading, for they give the sizes not of the land areas, but of the reefs, on which a greater or lesser number of narrow islets lie. Usually, but not always, these reefs lie in circles or ovals. Sometimes they are crescent-shaped, and here and there they are almost straight. The islets rarely measure more than a few hundred yards in width, though the length of some of them is extended. A few are a mile, or even several miles in length. For the most part, however, these so-called islands are made up of several, or even of a dozen or more islets of varying lengths. Always, however,

they are low, and rarely rise more than 10 feet above the sea.

The total land area in the 16 Gilbert Islands is 166 square miles. Thus the average dry land area in each atoll is about $10\frac{1}{2}$ square miles, but there are great differences among them.

From northwest to southeast they are as follows:

1. Little Makin, or Pitt Island.

An atoll about $2\frac{3}{4}$ miles by $\frac{1}{2}$ mile, with a village. Population (1937) 746, including 2 white men.

2. Makin, or Taritari, or Touching Island.

An atoll 11 miles from east to west with a good lagoon surrounded by four main islets and several lesser ones. The lagoon has two entrances and offers a good anchorage. It is interesting that even in 1937 a Japanese firm—Nanyo Boyeki Kaisha—was represented there. Population (1937), 1,643, including 12 white men.

3. Marakai, or Matthew Island.

About 5 miles by 3, this atoll has no good anchorage. In addition to copra it produces some sponges. Population (1937), 1,688, including 4 white men.

4. Apaiang, or Charlotte Island.

A large atoll measuring 16 miles by 5, with a long islet stretching along its eastern side. The lagoon has a good anchorage with an entrance 16 feet deep. Population (1937), 2,424, including 18 white men.

5. Tarawa, or Knox Island. Sometimes called Cook.

This 22-mile atoll is one of the largest in the group. It has nine large islets and several smaller ones, and there is an entrance to its large lagoon. Ashore are a leper station, a lunatic asylum, and a school for native boys. Population (1937), 2,640, including 20 white men.

6. Maiana, or Gilbert, or Hall Island.

Nine miles by 6, this atoll is principally one elongated

islet on the east side of its lagoon. It has six villages. Population (1937), 1,412, including 2 white men.

7. Kuria, or Woodle Island.

This small atoll is 4 miles by 2 and has one village. Population (1937), 262, including 1 white man.

8. Aranuka, or Henderville Island.

Two islets on a reef 6 miles long, this atoll has one village. Population (1937), 289, including 1 white man.

9. Apamama, or Hopper, or Roger Island.

An atoll about 12 miles by 5, with four villages and an anchorage in the lagoon good for ships up to 500 tons. Population (1937), 841, including 6 white men.

10. Nonuti, or Sydenham Island.

This atoll measures 24 miles by 10, and has four villages about its large lagoon, which has an entrance and a good anchorage. Population (1937), 2,084, including 4 white men.

Southeast of Nonuti the Gilbert chain is double, Tapiteuea and Onotoa lying to the west and the others to the east.

11. Tapiteuea, or Drummond Island.

This is a narrow, elongated atoll about 50 miles in length. It has five villages, has the greatest land area and supports the largest population in the group. Population (1937), 3,856, including 5 white men.

12. Onotoa, or Clerk Island.

A 12-mile atoll with no anchorage. Population (1937), 1,605. No white men.

In an irregular line 50 to 100 miles east of Tapiteuea and Onotoa lie the following atolls:

13. Peru, or Beru, or Francis Island.

An atoll 11 miles in length. Population (1937), 2,468, including 14 white men.

14. Nukunau, or Byron Island.

An atoll 8 miles by $1\frac{1}{2}$, with three villages. Population (1937), 1,765, including 3 white men.

15. Tamana, or Rotcher Island.

A small atoll, 3 miles by about $\frac{3}{4}$. Population (1937), 1,110. No white men.

16. Arorai, or Hope Island.

A small atoll about 4 miles by 2. Population (1937), 1,507. No white men.

The Ellice Islands, the northernmost of which is almost 200 miles south of Onotoa in the Gilberts, are much smaller than their northern neighbors. They are, however, more elevated, sometimes reaching altitudes of 80 or 90 feet. Nine in number, their total land area is only 14 square miles, though their alternate name, the Lagoon Islands, points clearly to the fact that they are typical atolls with their reefs and their islet clusters enclosing, or partly enclosing, shallow lagoons. They, too, grow coconuts, and produce a little in the way of pandanus fruit and yams, but their populations are small.

From northwest to southeast they are as follows:

1. Namomea, or Namune, or St. Augustine Island.

Population, 225.

2. Nanomana, or Nanomanga, or Hudson Island.

Population, 545.

3. Nuitao, or Speiden, or Lynx Island.

Population, 604.

4. Nui, or Netherland Island.

Population, 431.

5. Vaitupu Island.

Population, 687.

6. Nuku Fetau, or De Peyster Island.
Population, 439.
7. Funafuti, or Ellice Island.
Population, 353.
8. Nuku Lilai, or Mitchell Island.
Population, 253.
9. Nurakita, or Sophia Island.
Population, 39.

The people of the Ellice Islands are Polynesians who went to those islands some "thirty generations" ago from Samoa. They speak Samoan and are physically similar to the people of those islands. Those who occupy the Gilbert Islands, however, are a darker and coarser type. They, too, undoubtedly have some Polynesian blood, although it is much intermixed with other types. Tall and inclined to overweight, they are nevertheless vigorous and energetic. In their native state they made swords of wood, on the blades of which murderous sharks' teeth were set. Their canoes are made of coconut wood boards "sewn" together with fiber and fastened on frames. Perhaps the most remarkable thing about them is their ability to thrive and to increase to such numbers on the limited products of these islands which, except for coconuts, yams, taro, and pandanus fruit, offer only the many fish of the lagoons.

Both archipelagoes were discovered by Captain John Byron in 1765, and were later visited in 1788 by Captains Gilbert and Marshall. They were annexed by Great Britain in 1892, and the natives have been Christianized since the 1880's. Known as the Gilbert and Ellice Colony, they are governed under a Resident Commissioner who is responsible to the High Commissioner for the Western Pacific at Suva, Fiji.

Of only the slightest importance commercially, these fragments of land in the center of the Pacific are highly

important as airplane landing places. In times of peace they may prove useful in the development of transoceanic air routes between Australia and the United States or Canada.

About 225 miles southwest of Nurakita (Sophia Island) in the Ellice Group is the island of Rotuma. Measuring $8\frac{1}{2}$ miles east and west by 3 in width, it is shaped very much like a bottle with a narrow neck and a large, round-headed stopper. Offshore lie 7 other tiny islands, one of which is double with so sharp a division that it appears to have been split with a giant ax. The main island reaches an elevation of 860 feet and though it is fringed by a coral reef it is not itself of coral. It supports a population of 2,300. The population seems clearly to be Polynesian though their language is more Melanesian in character. Discovered in 1791 by Captain Edwards, the island was annexed by Great Britain in 1881. A Resident Commissioner and seven district chiefs administrate the local government which is responsible to the High Commissioner of the Western Pacific in Suva, Fiji. Widely separated from the Fiji group it is nevertheless sometimes included as a part of that archipelago.

About 350 miles southeast of Rotuma and 300 miles northeast of Fiji are the two French-owned islands of Futuna and Alofi. Known together as the Hoorn, or Horn Islands, Futuna is 11 miles by 4, and Alofi, 2 miles to the southeast, is 6 miles by 3. Each has a ridge down its center and Futuna reaches an elevation of 2,500 feet in Mt. Singavi, while Alofi's highest peak is 1,200-foot Mt. Bougainville. Both islands are densely wooded and support about 1,200 people. The timber of the islands is of value.

Some 125 miles farther to the northeast lies French controlled Uea, or Wallis Island. An oval coral reef surrounds an island 8 miles by 3, about which, in the wide

lagoon and on the reef which lies 1 to 3 miles offshore, are eight or nine islets. Nukuatea, 1 mile south of the main island and about 1 mile in length, is the largest of the islets. It lies just within the reef. The main island is volcanic, is hilly and wooded, but is not high, the greatest elevation being 479 feet. Several small lakes lie in the crater of an extinct volcano and there are three principal villages—Matautu, Lano, and Mua. The population is 4,200.

Uea, together with the Hoorn Islands of Futuna and Alofi, is governed from Noumea, New Caledonia.

Niuafou, which has been nicknamed "Tin Can Island," lies about 190 miles northeast of Suva, Fiji. It is controlled by the British from Suva, and is 5 miles in diameter. The odd part of it is that though it is purely volcanic and has no reef, it is an almost perfect circle of land surrounding an almost equally circular lake in its center. From the sea to the lake is about $1\frac{1}{4}$ miles. Except for certain lava beds that run off into the sea the land rises from the sea in cliffs 60 to 70 feet high. From this elevation the land slopes gradually up for $\frac{3}{4}$ of a mile and there rises abruptly to a ridge of about 400 feet elevation. From this narrow ridge rise eight volcanic cones to elevations of 500 to 700 feet, but the inner side of the ridge drops precipitously to the lake shore. The waters of the lake are alkaline, and are said to rise and fall with the tide.

There is no pure water on the island, and the rainfall is insufficient for the needs of the 1,229 people. They do not suffer, however, because of the liquid they obtain from coconuts.

The flora of this island is prolific. The coconuts are said to be the largest in the Pacific, and mango, breadfruit, bananas, oranges, yams, taro, arrowroot, tapioca, melons, pineapples, and other products are raised. The fauna is poor, with only a few rats, "flying fox" bats, and several species

of lizards. A crab the size of a dinner plate, which eats coconuts, is common on the island, and though insects are few, there is a praying mantis which grows to a length of 12 inches.

Landing on Niuafoou is difficult and the island got its nickname because the natives swim or canoe out to passing mail ships and carry the mail from and to the island in a tin can lashed to a pole.

About 125 miles east of Niuafoou are the two small islands of Niuatobutabu and Tafahi. Controlled from Suva, Fiji, as Niuafoou is, these two tiny islands, which lie within only a few miles of each other, together support only 829 people.

West of the Gilbert Islands about 300 miles, and less than one degree south of the equator, lies Ocean Island, and almost 200 miles farther to the west is Nauru. Both of these islands are small, Ocean being $1\frac{1}{2}$ miles by 2 and Nauru 2 by $3\frac{1}{4}$. Their value lies in their large deposits of phosphate rock which is being mined on both islands. Both islands have narrow fringing reefs and neither is elevated, Ocean's highest hill being 265 feet above sea level and Nauru's only 197 feet. Neither has a harbor.

CHAPTER SEVEN

The New Hebrides, Loyalty Islands, and New Caledonia, Including Norfolk and Lord Howe Islands

ABOUT 475 MILES directly west of Viti Levu, the largest island of the Fiji Group, lies the 535-mile chain of the New Hebrides Islands, at the northern end of which are the lesser Banks and Torres Islands. These groups are under the supervision of *both* Great Britain and France, each of which, under an arrangement called a "condominium," and which critics of the idea have sometimes referred to as "pandemonium," look out for the interests of their own nationals, while the two together legislate for and administer the affairs of the natives who, however, also play a political part in internal affairs. The administrative center of this strange arrangement is at the town of Vila, on the island of Efate which is centrally located in the New Hebrides.

These islands, incidentally, together with the Santa Cruz and the Solomon Islands to the north and west, and the Loyalty Islands and New Caledonia to the south and west, form a kind of line of demarcation between the vastness of the Pacific Ocean and that considerable portion of the southwest Pacific which is called the Coral Sea.

The New Hebrides Islands are volcanic in origin and lie in the form of an extended Y, slanting from the south-southeast to the north-northwest, with the eastern arm of

the Y running almost due north. The lower section of the Y is made up of four main islands, the western arm of three, the eastern arm of four, while one main island lies between the two arms. There are about 80 islands in all, with a total area of 5,700 square miles and a population of 50,000. Twelve of the islands are of good size, but the others are small, many being mere offshore islets. The principal islands are:

Espiritu Santo	Maewo	Efaté
Malo	Pentecost	Eromanga
Malekula	Ambrym	Tanna
Aboa	Epi	Aneityum

Efate is the island that marks the junction of the arms with the stem of the Y and, as has already been said, is the administrative center of the condominium. It is 30 miles east and west by 20 north and south and on its southwestern side is indented by semicircular Mele Bay, which is almost 10 miles wide, and upon which, on its eastern shore, lies the town of Vila (formerly called Franceville), capital of the condominium and commercial center of the group. Because the entire white population of this somewhat extended group is only about 1,000 (981 in 1937) and many of these are planters occupied during most of the time with overseeing the many large plantations of the islands, Vila is about the only "white man's town" in the group. Here are to be found the British and French members of the government, together with most of the merchants and professional men of the archipelago. The greater part of these, as well as of the planters, are French.

The island is well equipped with roads, and the many plantations are principally engaged in the production of cocoa, copra, and coffee. In order to obtain cheap and efficient labor, the natives not being particularly interested in such employment, the French have imported some

Tonkinese from French Indo-China, and almost 2,000 of these Asiatics are in the archipelago. Efate has its share of these, but in addition to the white and Tonkinese population there are only about 1,700 natives.

The island is bold and rises abruptly from the sea. The northern part is hilly and near the north central coast one peak reaches an elevation of 2,218 feet, but the southern half of the island is lower and is largely under cultivation. Kauri pines and candlenut trees are found in quantity, and other species abound. Even the coconut is not confined to the coastal regions but grows well in the fertile valleys and on the hillsides. Sandalwood is also to be found, and bread-fruit, sago palms, bananas, sugar cane, yams, taro, arrow-root, oranges, and pineapples are grown.

On the northwest coast of Efate the village of Havannah is situated on a good harbor formed by a small island just offshore, and a couple of miles off the north coast are the two small islands of Nguna and Emau, or Mau.

Sixty-two miles south-southeast of Efate is the island of Eromanga, 20 by 30 miles in size. It has several good anchorages and a peak called Traitor's Head rises to 2,600 feet about the center of the island. It is well watered and fertile, but is rugged and not well developed. A number of missionaries were murdered on this island between 1839 and 1872, when its population had a bad reputation, but the natives are few today and the island is largely given over to the raising of sheep.

Tanna Island lies 24 miles directly south of Eromanga. It is about 22 miles from north to south and its greatest width is 12 miles. Well watered and wooded, Tanna is the most fertile and attractive island of the group. Its interior is rugged, and Mt. Merrin reaches 3,200 feet, but even this highest point is covered with vegetation. The village of Lenakel is on the western side, and the 6,500 natives of the

island are responsible for most of its products. Excellent farmers, their products are superior. They raise coconuts, sugar cane, taro, and yams, and have had some success with horses, cattle, sheep, and goats. There is a white settlement at Port Resolution on the southeast coast, and 3 miles inland from this village is a low, active volcano. Molten and incandescent lava glows in the crater constantly, but there has been no serious eruption since the 1880's. Sixteen miles to the northwest is the 3-mile island of Aniwa, and 44 miles to the east lies somewhat smaller Futuna, which should not be confused with the Futuna that is one of the Hoorn Islands, 800 miles to the east and north.

Aneityum Island lies 38 miles south-southeast of Tanna. It measures 8 by 12 miles and is the most southerly of the entire group. A central peak reaches 3,000 feet, and the coastal region is fertile and productive. Timber—especially Kauri pine—is abundant, and the good harbor of Anelgauhah, on the south coast, was formerly frequently visited by whalers. At that time the population of this little island was large, but the white man's diseases, introduced by the whalers, have greatly reduced it.

Eighty miles north-northwest from Efate lies the island of Malekula in the western arm of the archipelago's Y. It is the second largest island in the entire group and is about 58 miles from north to south. Somewhat irregular in shape its greatest width is 25 miles, though it has a narrow, middle section that measures no more than 7.

A broken range runs its entire length, but reaches no great elevations, its highest peak being only 2,925 feet. Its eastern coast is broken by many good harbors and the island has many streams. Its interior is not developed, and is not well known, the natives dwelling there being supposed to be unfriendly and dangerous. The coastal natives, however,

are quiet and friendly, and there are a good many white settlers. Port Sandwich on the southeastern coast is on a fine landlocked harbor.

Twenty-two miles north of Malekula lies Espiritu Santo, the largest island of the group. Some 73 miles north and south by 36 in width, Espiritu Santo is basically square with two peninsulas extending to the north from its northwest and northeast corners. The western one of these is by far the larger, and measures roughly 8 miles in width by 36 in length. Between this peninsula and the lesser eastern one lies the Bay of St. Philip and St. James, a body of water 10 miles wide and 18 long.

A mountain range extends the length of the western side of the island and forms the backbone of the large peninsula. Its highest peak, Mt. Santo, reaches 6,195 feet. The island is heavily wooded and has many streams, some of which are navigable. There are several good harbors as well, and many valleys are broad and fertile, but the population is mostly in the south and is only about 4,000. At the southeastern corner, Second Channel, a mile or so wide, separates the little island of Aore from Espiritu Santo, and looking out across the channel toward the smaller island is the town of Luganville. This is second only to Vila in the entire group and is a congregating place for French and British planters, many of whom have plantations in the southern part of Espiritu Santo or on the 5-mile island of Aore. Just beyond Aore, too, and separated from it by a 2-mile channel, is the fertile island of Malo, practically all of which is cultivable. Measuring roughly 8 by 11 miles, Malo is filled with plantations, many of which cultivate 5,000 acres.

East of Espiritu Santo about 30 miles, and lying between the arms of the New Hebrides Y, is the island of Aboa. Approximately 26 miles by 9, with its length east and west, it has a central peak 4,000 feet in elevation. There are

few white planters on the island, but the natives, of whom there are about 5,000, raise coconuts and other crops.

The island of Maewo is the northernmost in the eastern arm of the Y. Only 3 to 4 miles wide and extending north and south, it is about 34 miles in length. It has the heaviest rainfall of the group and has numerous swamps and clouds of mosquitoes.

Directly south across a channel only 5 miles wide is Pentecost Island. Of much the same proportions as Maewo, though slightly wider and 39 miles from north to south, Pentecost is more pleasant. A few white planters are installed there and in the northern part the natives are definitely of a Polynesian cast.

The central ridge of the island is peculiarly straight and one peak reaches 3,130 feet. The island is heavily wooded and the agricultural land is all near the sea.

Ambrym and Epi are the two remaining islands in the eastern arm of the Y. Ambrym is the more northern of the two and measures 29 by 18 miles. Mt. Minnei, on this island, is an active volcano which, in 1913, laid waste much valuable agricultural land and destroyed the homes of many natives. Fortunately there was little loss of life, and the island made a quick recovery. Today it is heavily covered with vegetation except on the actual lava flows.

Epi, 7 miles to the south, is smaller and measures about 6 miles by 25, but 11 miles of its length is a 2-mile-wide southeastern peninsula. A central peak reaches 2,785 feet, but aside from the central elevated portion the island is ideal agriculturally, and some of the finest plantations in the archipelago are to be found here. The population is about 3,000.

Lying in the channel that separates these two are the two small islands of Paama and Lopevi. Paama is about 4 miles by $1\frac{1}{2}$ and Lopevi approximately 2 by 3. Southeast

of Epi and some 4 miles from the tip of its southeastern peninsula is the 2-by-3-mile island of Tongoa, just beyond which to the southeast is a group of four little islets sometimes called the Shepherd Isles. Fourteen miles south of Epi is Emae Island, which is 4 miles in length and 1 in breadth. Near it are four islets, one of which lies just to the west and three to the south at distances of 2 to 10 miles.

The Banks Islands

East-northeast of the northern tip of Espiritu Santo lie the six small Banks Islands. Only Gaua, or Santa Maria Island, and Vanua Lava are of any size, but there are also the four lesser islands of Meralav, Mota, Valua or Saddle, and Ureparapara or Norbarbar.

Gaua Island lies closest to Espiritu Santo, and measures 10 by 12 miles. It has a central peak of 2,300 feet elevation, and the village of Loso Lava lies on its northern coast. Volcanic, fertile, and well watered, as are all these islands, Gaua is productive of little besides what the few natives need in order to survive, although it is luxuriant in vegetation and is heavily wooded.

Seventeen miles directly north lies Vanua Lava, an island about 10 miles east and west by 17 miles north and south. It has a peak near its northern coast that rises to 3,000 feet and one near its southern coast that reaches 3,120 feet. Tiny Port Patterson is on its eastern side. Except for these details it is essentially a duplicate of Gaua.

Meralav, or Star Peak, a circular islet a mile or so in diameter and 2,900 feet high, lies 30 miles southeast by east of Gaua. Mota, a somewhat similar islet 1,350 feet high is 7 miles east of Vanua Lava, and Valua or Saddle Island, about 3 miles by 1, is 8 miles to the northeast, with an elevation of 1,465 feet. Ureparapara or Norbarbar, which is the largest of the lesser Banks Islands, is 13 miles north by west of Vanua Lava. It is approximately circular

and about 3 miles in diameter, with a peak 2,440 feet high. A deep indentation on its eastern side is caused by the broken side of an extinct volcano, the crater of which has been flooded by the sea, creating a fine little harbor.

Aside from these two considerable and four small islands the Banks group contains nothing but a few rocky islets. Being volcanic, however, the islands are fertile and the tropical and semitropical vegetation usual to these latitudes supplies the 2,200 Polynesian natives with their necessities.

The Torres Islands

Fifty miles northwest of Vanua Lava lies the closest island of the small Torres group. Four in number, with two or three additional outcroppings, they are Hiu, Tegua, Loh, and Toga. Hiu is northernmost and measures about 8 miles by $1\frac{1}{2}$. Tegua is less than 2 miles in any dimension, while Loh and Toga are much smaller.

This group differs from the Banks Islands and the New Hebrides in not being of volcanic origin. Lying on reefs, but without lagoons, they reach elevations of several hundred feet (one spot on Hiu is just over 1,000) and are covered with vegetation. They are undeveloped and unimportant commercially, and support only about 200 natives of Polynesian type.

The climate of all these islands is hot and damp, but the season from November to April is especially so. At that time the archipelago is inclined to be unhealthful for all but the natives.

The flora of the islands is abundant and a wide range of tropical fruits and vegetables grows luxuriantly. Cocoa, copra, and coffee are the most important exports, and some cotton and a little maize (corn) is raised. Among the other products are breadfruit, sago, bananas, oranges, pineapples, yams, taro, and arrowroot, most of which are for local con-

sumption and form but a small part of the archipelago's exports. Kauri pines and certain other trees are valuable for lumber.

Land mammals native to the islands are scarce. Bats and rats are indigenous, and wild pigs are common but they are descendants of escaped domestic pigs. There are a few lizards and turtles. Parrots, swallows, ducks, and pigeons make up most of the bird population, and locusts, grasshoppers, butterflies, and hornets are numerous, while mosquitoes are a serious pest on some of the islands. The sea about these islands has many fish, but they are mostly inferior as food and some of them are poisonous.

The natives are Melanesians but are of mixed blood. On some of the islands there are certain isolated Polynesian groups. For the most part, however, the natives are black, with woolly hair, receding foreheads, broad faces, flat noses, and thick lips. They wear nose rings, ear decorations, and bracelets of shells. The men were formerly much given to fighting and used poisoned arrows, clubs, and spears, all of which were often beautifully designed and decorated. Their houses are either round huts or rectangular structures with thatched roofs supported on rows of posts. Villages are kept clean and are usually ornamented with flowering shrubs. Sometimes they are fortified with stone walls.

It has been said that the natives are inclined to ferocity and treachery, but it is not unlikely that this opinion is based to some extent on their opposition to the treatment they received at the hands of the earlier white visitors to the islands, for "labor agents" often used to inveigle or force many of them into virtual or actual slavery.

They believe in sorcery and pray to the recently dead. Sometimes idols, or even stones, represent gods that possess varying degrees of potency in their eyes.

Most villages have a space, generally beneath some wide-spreading banyan tree, for dances and public meetings. The

men are divided into classes according to the "clubhouse" to which they belong. These ranks are so clearly understood that a man's rank is somehow recognized even when he visits a district in which his dialect is not understood. The dialects of the islands are diverse, though they stem, for the most part, from Melanesian sources.

The islands were discovered in 1606 when Pedro Fernandez de Quiros came upon Espiritu Santo. By the middle of the nineteenth century traders and missionaries had begun to open the islands to western development and both French and British took part. In 1886 a serious native outbreak occurred and the French sent troops in. In 1887 an Anglo-French understanding provided for supervision of the islands by both countries and in 1906 the present condominium was set up, arranging for joint control. This arrangement has been much criticized by Australians who have always viewed the New Hebrides as valuable for the development of outlying defense bases.

Commercially of only minor value, it is now widely realized that these islands are vital to the protection of Australia's east coast and the lines of communication between Australia, New Zealand, Fiji, Samoa, Hawaii, and America. Following the outbreak of war in 1941 and the Japanese conquests in the East Indies, the United States, with British and Free French permission, established an airfield on the island of Espiritu Santo which, some 400 miles from the nearest of the Solomon Islands, is an important reserve base.

The Loyalty Islands

About 160 miles to the southwest from the southern end of the New Hebrides is the lesser Loyalty Island chain, made up of three large elevated coral islands and eight or ten tiny islets and reefs. The large islands are, in the order of their size, Lifu, Mare, and Uea, and they lie in a straight

line extending from northwest to southeast about 65 miles northeast of the immensely greater island of New Caledonia. Totalling approximately 1,050 square miles in area, the group is lacking in notable physical landmarks, and supports a population of about 10,000.

Lifu is the central island of the group. About 40 miles in length by 10 in average width, it is irregular in shape but is remarkably flat. It has no hills or streams and no physical features of any size except a central ridge of rocks that attains an elevation of almost 200 feet. This ridge is riddled with caves, some of which contain deep pools of fresh water. The soil is red and thin but it is fertile and grows unusually large bananas, yams, and taro. The village of Nathala is on the eastern coast; Gatcha is beside the 10-mile-wide Sandal Bay on the west coast; and Chepenene, the island's third village, lies across the same bay on its northern side. The island of Mare, 26 miles southeast of Lifu, measures 26 miles by 15 and is much the same in appearance as its greater neighbor, though its greatest elevation is 230 feet. Tadino and Goudma are two villages on the west coast and Ro is on a good bay on the northern side.

Uea lies northeast of Lifu about 30 miles and is made up of an isthmus $\frac{1}{2}$ mile wide and 5 miles long connecting two rectangular sections, the southern of which measures 2 miles by 3 and the northern hardly more than half that size. Its extreme length is about 10 miles. On the western side a coral reef forms two sides of a triangular lagoon, the third side of which is the island itself. Low, flat, sandy, and wooded, with several wooded islets on the reef, Uea supports three villages. One is Uea which faces the lagoon near the island's northern end; another is Lekia which overlooks the lagoon at the southern end; and the third is Muli which is on one of the islets that rise from the reef.

Only one other island in the group is of the least consequence. It is Tiga, which lies 15 miles directly north of the northwest tip of Mare and 20 miles east of the southeastern end of Lifu. It is less than 2 miles in length and less than 1 in breadth.

New Caledonia

New Caledonia is a large, elongated island lying parallel to and 65 miles southwest of the Loyalty group. Almost exactly 250 miles in length and about 38 in greatest breadth it lies in a northwest-southeast line some 700 miles east-northeast of the nearest point on Australia. From 1 mile to 20 miles off its southeast coast and extending far beyond the island's ends both on the southeast and the northwest is a prolonged coral reef which, from end to end, measures almost 400 miles. On the northeast coast another but much more interrupted reef closely fringes the island, though at the northwest end it, too, separates itself from the island and extends for more than a hundred miles parallel to and 30 to 40 miles distant from its southeastern counterpart. Between the extensions and beyond the ends of these two reefs are a number of lesser islands, while a somewhat larger one lies 35 miles off New Caledonia's southeastern tip and others still, though they are very small, lie close beside the central island's shores.

New Caledonia is mountainous and irregular of surface though, for an island so large, none of the elevations are extreme. Near the northern end and close to the northeast coast Mt. Colnett reaches 4,954 feet, and 9 miles to the southeast Mt. Panie is 5,413. About the center of the island, Mt. Boulinda and Mt. Me Maoya are 4,078 and 4,728 feet respectively. Fifty miles from the island's southeast tip Mt. Humboldt is 5,361 feet in elevation and overtops two near-by peaks, both of which surpass 4,000. There are six-

teen rivers on the island and their headwaters, flowing in opposite directions, are often within short distances of each other on the island's irregular central uplands.

The coast is much indented and many useful harbors are available, the finest of which is near the southeastern end of the island on its southwestern side. Noumea, the chief town and the capital of this French colony, is located on this harbor, and from here not only New Caledonia but also all the other scattered French possessions in this portion of the Pacific are administered. All along the southeastern coast of the island the outlying coral reef forms a navigable and protected channel beside the coast and creates a protected strip of water 1 to 20 miles in width and the full length of the extended reef.

By comparison with many Pacific islands New Caledonia appears bare and even arid. The prevailing growth is a small, colorless little tree known locally as the Niaouli that is a little like the eucalyptus of Australia. Along the coast coconut palms grow readily and many valleys have fine groves of Kauri pines, but for the most part they do not tend to cover up the island's bareness.

There has been great erosion on the hill slopes, for the rainfall is heavy and the soil is easily reduced to powder. Thus there is much "saw-tooth" country and the landscape is cut and scarred.

Despite this bare look the island is productive of coffee and copra, but its principal sources of wealth are mineral and marine. Rich nickel mines produce the most valuable single export. Coffee is next in value, while mother-of-pearl, trochus shell, and preserved meat follow in that order. The trade is normally carried on mostly with France and Belgium.

There are also deposits of chrome ore, iron, manganese, cobalt, antimony, mercury, cinnabar, copper, silver, lead,

and gold, but none of these equal the importance of New Caledonia's nickel.

Cattle and sheep raising have come to be of some importance.

The natives of the island are easygoing landowners and cannot be prevailed upon to work for wages. Thus the French have imported many laborers and domestics from Tonkin and from Java.

More than fifty towns and villages are scattered about the island, only a few of which are in the interior. Furthermore, with a total population of only some 51,000 it is obvious that not many of them are large. Noumea, however, has a population of 11,108 and is one of the largest towns in the South Pacific.

Lying on an exceptionally fine harbor, created by a 3-mile island which lies across the sea side of a triangular indentation in the coast, Noumea is flat and laid out in square blocks, the streets running parallel, east and west, and north and south. The town was once hot, dusty, and unattractive, but the planting of coconut palms and other trees along the streets and in the central square has greatly improved its comfort and appearance. Most structures are one story in height and most of them are of wood. The cathedral, however, which is east of the town on hills that slope up, is the more striking because of the low buildings in town. Pan-American Airways have a seaplane base on the island—Ile de Nou—which encloses the harbor.

The more important other island ports are Thio, Hienghene, Touho, Poru, Canaca, Pam, Paagoumene, Teoudie, Mueu, and Kune.

The climate in New Caledonia is healthful and not particularly hot. The warmest months are December to March, but usually fresh breezes blow and temper the heat. There

is less moisture and the fauna is less tropical than on the islands to the east and north. The vegetation bears a slight similarity to that on New Zealand which lies 600 miles to the southeast. On the west coast certain Australian characteristics are noticeable in the vegetation. On the higher levels the vegetation is somewhat stunted but lower levels often produce excellent grass suitable for cattle and sheep. There is a considerable variety of trees useful for lumber.

Breadfruit, bananas, sago, vanilla, ginger, and arrow-root grow wild. Coconuts, cocoa, sugar cane, rice, cotton, coffee, and tobacco are raised. Certain temperate-zone vegetables are grown, as well as oranges and indigo.

Indigenous mammals are limited to rats and bats. Although there are few species of birds, parrots, ducks, kingfishers, and pigeons are common. The kagu, a flightless bird, is peculiar to the island. Fish are numerous but some are poisonous, and turtles are common. Both land and marine molluscs are plentiful and some are edible.

The people of both New Caledonia and the Loyalty Islands are Melanesian, although of mixed blood. There are differences among them, however, and some show more Papuan influence while others are somewhat Polynesian in type. The Polynesian influence is noticeable in lighter skin color and better proportions, but the Papuan influence is wider. Thus most New Caledonians are somewhat small and slender, with short, woolly, black hair, narrow, retreating foreheads, long narrow heads, heavy eyebrow ridges, flat noses, and very dark skins. The Polynesian influence is more noticeable among some of the people of the Loyalty Islands and on the eastern side of New Caledonia. The chiefs are generally more Polynesian in type.

Formerly both sexes went naked or wore only a scanty loincloth. Huts are shaped like old-fashioned beehives and have a single room. Chiefs hold their positions by heredity and a supreme chief was formerly recognized. When a

chief's son is born the father gives up the post to him but acts for him as regent. Property is inherited by the eldest son upon whom, however, the others have a claim. The standard of morality is low, women were formerly little more than drudges, and infanticide was common.

They are good farmers but show no interest in working for wages. They are very limited in their ability to count and their numbers go up only to five. Ten thus becomes "two fives" and 20 is "man." This apparently comes from the number of a person's fingers and toes. "Five men" would be 100 but this is verging on higher mathematics.

They have few traditions. Cannibalism, while apparently never as rampant as it was in Fiji, was not unknown. Their taste in carving and decoration is good. Their language is more limited than is that of the average Polynesian, and many different dialects are spoken on New Caledonia and on the adjacent islands. Thus natives are often unable to make themselves understood among other natives even though their two groups may not be widely separated.

Tattooing was confined to women, but both sexes pierced the lobes of their ears and thrust ornaments therein.

Off the southeastern tip of New Caledonia about 30 miles is the Isle of Pines (Ile des Pins, or Kunie). About 7 by 12 miles in size, it is used by the French as a convict station and has a total population of 570.

Some 28 miles northwest of the northwestern tip of New Caledonia and lying between the two coral reefs that extend from its sides to the north are the small Belep Islands. Of these Art Island is 12 miles in length by 2 in width and supports the two villages of Uala and Andiane at its northern and southern ends respectively. Pott Island, about 5 miles long and 1 in width, lies 2 miles to the northwest, and four or five little islets cluster in their neighborhood.

About 170 miles northwest of New Caledonia are the

smaller Huon Islands which are also a part of the territory administered from Noumea. There are three somewhat barren islets, whose total area is about 160 acres. They are useful for their guano deposits which are being worked by natives from the Loyalty Islands. They are Huon, Leleizour, and Surprise, off the last of which there is a safe anchorage in a crescent-shaped lagoon.

Some 285 miles west of the Huon Group are the eleven coral islets of the Chesterfield Group. Very narrow and measuring $\frac{1}{2}$ to $1\frac{1}{2}$ miles in length, they total only about 250 acres. Uninhabited, they are also guano islands though they are not being worked.

East of the Isle of Pines, off the southern tip of New Caledonia, and about 90 miles distant is Walpole Island. Normally uninhabited, this narrow island which is about $2\frac{1}{4}$ miles in length and 310 acres in extent is another guano island. Operations are being carried on by a limited number of laborers in the shipment of the guano.

These lesser islands are all under the flag of France.

About 30 degrees south of the equator and 168 degrees east of Greenwich is Norfolk Island. About 400 miles northwest of the northernmost tip of New Zealand, and almost exactly the same distance directly south of New Caledonia, Norfolk is administered by the Australian Prime Minister's Department. It is an island some 13 square miles in area and with an average elevation of about 400 feet.

Norfolk was discovered about 1780 and set aside for the use of the British Navy because of its tall, straight pine trees and native flax. But the pines proved too knotty for ships' masts and the flax was inferior, so the Navy lost interest. The island was uninhabited when it was discovered and remained so for years. Then a penal colony was set up there, but in 1856 that was discontinued.

At this time distant Pitcairn Island was becoming somewhat overcrowded with descendants of the mutineers of the

Bounty and they were offered larger Norfolk Island. Some hundreds of them came and 1,085 of their descendants live on Norfolk Island now. It has also become a station on a submarine cable connecting Canada with Australia and New Zealand.

There are two tiny islands off Norfolk's south shore—Nepean and Phillip islands. The climate of Norfolk is equable, the temperature ranging from 56 to 82 degrees. It is well watered and the islanders are reasonably prosperous.

West-southwest of Norfolk Island about 550 miles is Lord Howe Island, a crescent bit of land 7 miles in length and nowhere as much as a mile in width. Its area is 3,220 acres and it is luxuriantly covered with vegetation, but so bouldery is the surface that only about 300 acres are suitable for agriculture. Two peaks on the island—Mt. Gower and Mt. Lidgbird—surpass 2,500 feet. Formerly uninhabited, Lord Howe now supports about 150 people, and, on their limited agricultural land, they are able to grow almost any tropical and subtropical vegetation. Many *Kentia* palms and huge banyan trees grow on the island and the coral reef on its east side is said to be the most southerly in the world.

Lord Howe is now a meteorological station intended especially to be of service to ocean air lines, and it is remarkably prosperous owing to the fact that the seed for practically all the potted palms in the world are grown there. On this monopoly the people of this island thrive.

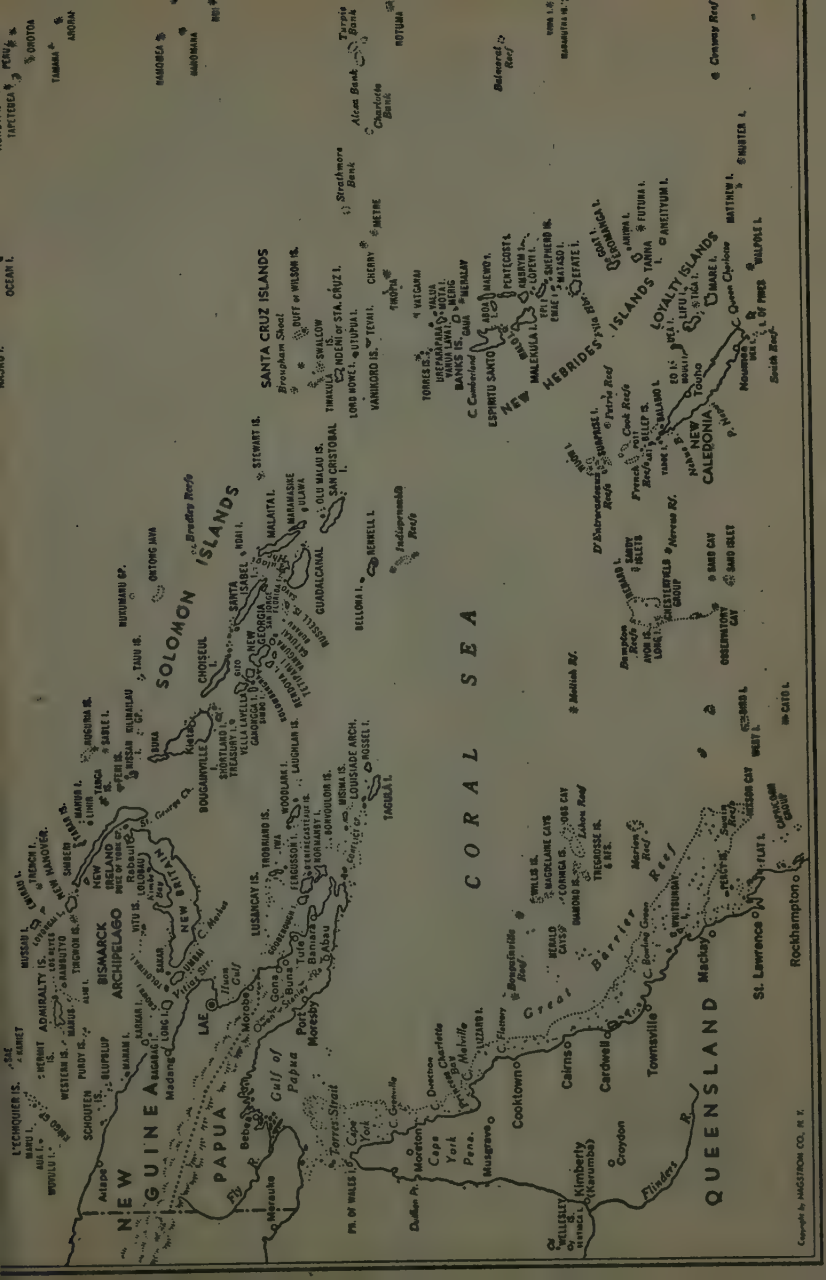
CHAPTER EIGHT

The Solomon Islands, the Bismarck Archipelago, the Santa Cruz, Louisiade, Admiralty, and Other Islands

NORTH AND NORTHWEST of the New Hebrides and New Caledonia lies an unusually large concentration of islands. These are the Solomon Islands, the Bismarck Archipelago, the Santa Cruz Islands, the Louisiade Archipelago, the d'Entrecasteaux Islands, the Trobriand Islands, the Admiralty Group, and other lesser groups and islands, the exact number of which it is difficult even to estimate. Twelve of these are comparatively large (the largest, New Britain, is greater in area than the state of Vermont), and the area of these twelve alone is more than 30,000 square miles. But in addition there are hundreds more, ranging all the way from islands of considerable dimensions down to islets and reefs almost infinitesimal in their smallness.

Except for the near-by and vastly greater island of New Guinea, no other important islands in all the world are so little known, so incompletely explored, so recently in contact with civilization. Few of them have ever been studied or described in any great detail. Furthermore, in a volume as limited as this, most of the lesser islands of these complicated groups cannot even be named in passing.

The region in which these islands lie is approximately 1,500 miles in length from the Santa Cruz Islands in the



southeast to the Admiralty Islands in the northwest and 500 miles in extreme width. The many groups and archipelagoes may be divided, however, into three main divisions—the Solomon Islands and their neighbors; the Bismarck Archipelago and its neighbors; and the lesser groups that lie to the east of Papua.

The Solomon Islands and Their Neighbors

The Solomon Islands—except for the islands of Bougainville, Buka, and Nissan—form a British Protectorate that is administered by the Colonial Office in London through the High Commissioner for the Western Pacific at Suva, Fiji. The Solomon Group is made up of ten large islands and many smaller ones, and the total land area is variously estimated at 14,600 to 17,000 square miles with the probability that the lesser figure is more nearly accurate. They extend from about 5 degrees south of the equator to 7 degrees south, and from 155 degrees east of Greenwich to about 162 degrees east; for administrative purposes they have the Lord Howe, the Santa Cruz, the Duff, and the Reef groups associated with them. The largest island of the Solomons, however—Bougainville—is administered by Australia under mandate from the League of Nations. Buka and Nissan, two lesser islands, are similarly administered.

The main islands of the group are mountainous, heavily wooded, and well watered. Bougainville and Malaita are somewhat heavily populated, but the rest are more sparsely inhabited. Just before the outbreak of war in 1941 the group held about 500 Europeans, 200 Chinese, and 95,000 natives. The islands normally export copra, trochus shell, timber, ivory nuts, green snail shell, bêche-de-mer, and turtle shell.

Following are the principal islands of the group:

Large islands	Secondary islands	
Bougainville	Florida	Russell
Guadalcanal	Shortland	Savo
Santa Isabel	Treasury	Bellona
Malaita	Gizo	Cherry
San Cristobal	Ganongga	Mitre
Choiseul	Arundel	Stewart
New Georgia	Rendova	Vanguna
Rennell	Tetipari	Nissan
Kolombangra	Gatukai	Buka
Vella Lavella	Maramasike	Fauro

These islands lie in a double chain stretching 720 miles from southeast by east to northwest by west, with the two chains merging at the southeast end in the island of San Cristobal and at the northeast in Bougainville, beyond which lie the lesser islands of Buka and Nissan. Only one of the large islands—Rennell—and one of the lesser—Bellona—lie outside this pattern and they are within 18 miles of each other about 110 miles directly south of Guadalcanal.

Bougainville is the largest of the Solomons and measures 125 miles in length by 49 in greatest breadth. Its area is about 3,500 square miles. A range of high but forest-covered mountains runs the entire length of the island and, in the south, where it is called the Crown Prince Range, the highest peak reaches 7,743 feet. Mt. Balbi, in the northern, or Emperor Range section of the same mountains, is 10,171 feet. This mountain is a steeply pyramidal volcano with a jagged crater that is active. In the Crown Prince Range several volcanoes are active.

The island has been crossed by government patrols several times since 1925 and a little of the interior has been traversed. For the most part, however, the more mountainous regions are unexplored.

Along the southwest coast there is an alluvial plain that is marshy in many places, and elsewhere about the island are lesser marshes just inside the mangrove swamps that frequently lie along the coast. These swamps, with the mangrove aerial prop roots and their swampy underfooting, are often all but impenetrable. In the north, Bougainville has some raised coral along its coast. The soil of the island near the coasts is often deep and rich. The streams are short and rapid and are rarely navigable even by the smallest of craft except at their mouths.

There are few harbors. At the north end of the island Buka Passage, the strait that separates Bougainville from Buka Island, is one of the best. On the northeast coast the village of Kieta lies on Rawa Harbor, and on the southeastern end of the island Tonolai Harbor offers good protection. Other than these, the harbors are fit only for small craft. Off the southwest coast there are several anchorages that are satisfactory for larger craft in good weather. Off the southeast coast near the village of Buin is a sheltered region between Bougainville and small Shortland Island which can be used as well.

Government headquarters for the district is at the northeast coast village of Kieta which normally has a nonnative population of about 180. On tiny Sohana Island in Buka Passage there is a secondary government post, and at Buin, on the southeast end of the island, there is a police post. Aside from these there are no European settlements on Bougainville though there are a few plantations on the northeast coast, two on the more northern section of the west coast, and one or two near Buin.

There are 150 to 200 miles of "roads" and bridle paths on the island but they are not of the best. Buka Island, which is just off the northern tip of Bougainville, is proud of the fact that on at least 40 miles of *its* roads *vehicles* can be used.

The vegetation of Bougainville, as of all the Solomons, is luxuriant and heavy. The plantations, however, devote themselves mostly to coconuts, though some cocoa is grown.

It has been estimated that there are some 60,000 natives in the district, which includes Bougainville, Buka, Nissan, and a few additional islets. The interior natives, who as yet are less influenced by white men than are the coastal natives, often raid the coastal villages, and tribal fights still occur.

Choiseul Island, the northwestern tip of which lies 32 miles directly east of Bougainville's southeastern end, is 85 miles long and from 4 to 20 in width. With a heavy coral reef along its northeast coast and a lesser one along its southwest side it is more reef-surrounded than any other in the group. Lying midway between Bougainville and Santa Isabel it is less mountainous and much smaller than either, but is fully as luxuriant in its verdure.

Thirty-five miles directly south of Choiseul is New Georgia Island and the somewhat complicated cluster of which it is the largest member. About 50 miles in length by 10 to 12 in width, New Georgia itself has no peak that exceeds 2,670 feet. Immediately off its southeastern and northwestern ends, however, are two circular islands, one of which—Vanguna—reaches an elevation of 3,686 feet, while the other—Kolombangra, which lies to the northwest—reaches 5,450 feet. All these islands are heavily covered with verdure, but the cone-shaped and extinct volcano of Kolombangra is most densely overgrown. Along the sides of New Georgia and Vanguna Island and, to some extent, between them is Marovo Lagoon which is enclosed on its extended northward side by a string of little islands. It is said to be the world's largest island-enclosed lagoon and is entered through an opening in a high cliff that separates the lagoon from the sea.

Other islands in this New Georgia cluster are Vella

Lavella, Gizo, Ganongga, Arundel, Wana Wana, Rendova, Tetipari, and Gatukai, of which Vella Lavella is the largest. The government station for the group is on the small island of Gizo. This little island lies between Kolombangra and Vella Lavella and has the usual marshy levels along its shore.

Santa Isabel, the northwest tip of which is 40 miles east of Choiseul's southeastern end, is a long, narrow island—120 miles in length and with an average width of hardly more than 12—made of a single heavily forested ridge with only the narrowest of coastal lowlands. It has clusters of little islands at its ends and coral reefs, here and there, off its coasts. Mt. Marescot, some 33 miles from the island's southeastern end, reaches 3,900 feet, but no other summit is more than half as high.

Small San Jorge Island, close beside Santa Isabel's southeastern end, helps to form what someone too generously called Thousand Ships Bay. The bay is large, though hardly large enough for a thousand ships, but it offers too little shelter, for the southeast trade winds blow squarely into its broad entrance. On the northeast side of the island near the northwest end, a coral reef and the tiny Gijunabena Islands turn what would otherwise be an unprotected anchorage into large and useful Rekata Bay.

Malaita, which lies 50 miles southeast of Santa Isabel, is the most heavily populated island in the group with the exception of Bougainville. On the other hand, the interior is practically unexplored and is rarely visited. Naked savages who interest themselves in headhunting still live there, and white men, unless they go protected, are likely to be in danger once they are out of sight of salt water. The coastal natives, too, are not on the best of terms with those in the interior who are not averse to raiding the coastal villages. In an effort to protect themselves against this danger some of the coastal natives have built a sort of artificial island a

little distance offshore where the water is shallow; and there they have created a kind of fortress to which, in time of danger, they may flee. Elsewhere in the archipelago other coastal natives have taken other precautions against the more savage inhabitants of inland jungles.

Malaita is abrupt, and its mountains come close to the narrow coastal lands. Its length is almost exactly 100 miles, but it is narrow, at no place exceeding 21 or 22. Its highest peak reaches 2,229 feet almost directly at the island's north-west tip, and it has no real harbors, though several open bays are useful in good weather.

Guadalcanal, or Guadalcanar, or Guanbata, is the second largest island of the Solomons. A little over 300 miles south-east by east of Bougainville, and 100 miles southeast of New Georgia, it is 30 miles southwest of Malaita and within 38 miles of the island of San Cristobal, the southernmost island of the group. The island extends 92 miles in length and 33 in greatest width, and is approximately 2,500 square miles in area.

The island is extremely rugged and has many densely forested "razorback" mountains, the highest of which—Mt. Popomanasiu—is 8,005 feet in elevation. The Kavo Range runs throughout the island's length. A band of coastal lowlands extends around the island but is narrower on the south than on the north side. Harbors are few and poor and the prevailing southeast winds make landing difficult on the southern coast. On the northern, however, except during "northwesters," it is usually not difficult except, of course, where mangrove swamps bar the way.

Along some parts of the coast are minor fringing coral reefs and sandy beaches are found at other points where the water is shallow well offshore.

The coastal lowlands along the north coast are broad, and it is here that the soil is deepest and richest. It is in this re-

gion that most of the island's coconut plantations are located, though much forest had to be cleared before the palms could be planted. Here, too, are the most considerable sections of level land, a feature somewhat notable in the rugged terrain of the Solomons. It was probably because the land near the north coast of Guadalcanal is level, and not at all because of the island's "value," that the Japanese decided, in 1942, to build an airfield some 32 miles west of the village of Aola and within 30 miles or so of Cape Esperance, the island's northwestern extremity. Inland and to the west of the airfield which, once it was captured by Americans, came to be called Henderson Field, Guadalcanal is mountainous and densely jungled and has few native villages. Here and there a short stream reaches the coast and in the interior there are no means of communication except along native trails. There are no good harbors anywhere about the island, though two small ones—Coughlan and Popau—are at the northwest end, and several open bays are usable when the weather permits.

Tulagi, the capital of the entire group, lies 22 miles to the north of Guadalcanal on a tiny island of its own so situated just off the shore of Florida Island as to create the finest harbor in the archipelago.

Florida, or N'Gela Island is one of the lesser islands of the group, but is 22 miles in length and varies from 3 to 4 miles in width. It is highly irregular and hilly, and many little islands lie close about its shores. Of these, Tulagi Island, on which the village of Tulagi lies, is the most important. The island is almost 3 miles in circumference, and consists largely of a palm-covered hill on which the small but attractive government buildings are comfortably spaced among well-kept gardens and paths. Their red roofs and white walls are bright in the vivid tropical sunlight and down by the harbor water front are the few business structures of the place. Motor launches and schooners, and

swarms of native canoes, are likely to be in the harbor when, in normal times, the steamer arrives from Sydney, Australia. Such a day is something of an event in Tulagi, for the regular steamer has never been scheduled to arrive oftener than once in five or six weeks, and other steamers are rare.

The white population of this island capital is normally about 40 to 50. In addition there are four or five times as many Chinese and, of course, the many natives, some of whom are government police. Furthermore, Tulagi has a telephone system, though the phones are few, and—which is no doubt more important—it has an ice plant.

With such a "city" almost within sight, Guadalcanal has no need of any real towns of its own. Thus the villages of Aola and Veisali on Guadalcanal's north coast and Bolanda on the south, with a few others like Kukumbona, Kukum, Lunga, Tenaru, and Tangarare, serve the island's purposes and give the district administrative officer the necessary stopping places when he makes his rounds.

San Cristobal; or Makira, like Guadalcanal, has its settlements mostly on the north side. It is somewhat smaller than Guadalcanal, however, and, lying 38 miles to the southeast of that island, is the final island of the chain in that direction. Some 80 miles in length by 22 in greatest width it is very much like Guadalcanal except that it is less mountainous. A government station at Kira is occasionally used by visiting officers, but the island has no district officer of its own. There are several plantations and a trading station or two, and Star Harbor, at the island's eastern end, offers good shelter in almost any weather.

About 110 miles southwest of San Cristobal is Rennell Island. It is in no respect similar to the other major Solomons, for it is a raised atoll composed entirely of coral limestone. Its low plateau is edged with perpendicular cliffs

which once formed the face of a coral reef beneath the level of the sea. The island slopes from its outer edges toward its center, and, because the eastern end was raised a little less than the western, the ancient lagoon has now been turned into a 15-mile-long lake in that less raised portion.

Rennell Island is 50 miles long by 12 wide. It has no streams and fresh water is scarce. Even the lake is brackish, but the natives drink its water. The island is covered with verdure except on its limestone cliffs, and it has only about a thousand natives on it.

An atoll of small islands known as the Stewart Islands, or Sikiana, lies about 110 miles east of Malaita. There is no entrance to its lagoon and within only a few yards of its outside reef the depth of the water is beyond the scope of an ordinary ship's cable. Few Europeans have ever set foot on the island, which is populated only by a handful of natives.

Ontong Java, or Lord Howe's Group (not to be confused with Lord Howe Island east of Australia) is a coral atoll of several islets roughly 160 miles north of Santa Isabel. The natives are Polynesians of mixed blood.

The Shortland Islands, the Treasury Islands, and Fauro are all grouped near the southeastern end of Bougainville. Faisi, one of the Shortlands group, is a district governmental station and a port of entry. It has a sheltered harbor and the island is largely planted to coconuts. Other lesser islands in these groups also support plantations.

The Santa Cruz Group, which lies 240 miles due east of the most southern Solomons, is made up of Santa Cruz Island (or Ndeni, or Lord Howe Island), Utupua, Vanikoro, and a scattering of little islands and islets. One of these—Tinakula—is an active volcano. Santa Cruz, incidentally, because of its alternate name of Lord Howe Is-

land, should not be confused either with Ontong Java (Lord Howe's Group) or with the Lord Howe Island between Australia and New Zealand.

Santa Cruz Island itself is 25 miles by 14 and is quite the largest of the group. About 62 miles southeast of Santa Cruz is Utupua, a circular island 8 miles in diameter with a great curving indentation that reaches into its very center from the west. This is Basilisk Harbor.

Another 30 miles to the southeast lies Vanikoro, an island 15 miles by 8 with one good harbor on its northeast side. A government post is maintained on this island.

The other islands of the Santa Cruz Group, of which there are about twenty, are all small and lie within 100 miles of Santa Cruz itself to the north and northeast.

This group never was important though formerly it produced a little copra. Now it is rarely visited even by trading schooners. The natives are Polynesians but are not of a high type. They are, however, well known for their excellent deep-sea canoes, or "tebukais."

The climate of the Solomons and the Santa Cruz Islands is not healthful for Europeans, since both the humidity and the heat are excessive, and malaria is endemic. The prevailing winds are southeasterly from April to November. From November to March there are calms broken by occasional—and sometimes prolonged—northwest winds that may be very heavy. Rainfall generally surpasses 160 inches a year.

Health conditions and other difficulties are such that the British Government has discouraged immigration. Malaria has been partially controlled, but blackwater fever, dengue fever, and dysentery also occur. Among the natives tuberculosis is common, dysentery is endemic, and leprosy not uncommon. Acute poliomyelitis is not unknown, and yaws and hookworm have long been troublesome.

No detailed study of the flora of the Solomons has ever been made, but the group is rich in palms, *lignum vitae*, and ebony. Sandalwood is not uncommon, and the mangrove swamps along many sections of the coast lines of these islands are extensive. Vegetation is luxuriant and the mountains are all densely jungled. Here and there are a few open grasslands but these form a small part of the total area.

The indigenous fauna is more numerous than on the islands to the east and south. There are rats that reach the size of rabbits, and phalangers with long tails and fluffy fur. Bats, including the large fruit-eating "flying foxes," are common, and also to be found are wild pigs and wild dogs which may or may not be indigenous. Whales, dugongs, blackfish, and porpoises are common in these waters and the natives still use porpoise teeth, to some extent, for money.

The mangrove swamps are infested with crocodiles and several peculiar species of lizards, snakes, both harmless and poisonous, and frogs are known. There is a great frog that reaches as much as 3 pounds in weight. Sea snakes, too, are often seen in these waters.

Birds include cockatoos, parrots, pygmy parrots, kingfishers, ducks, eagles, ospreys, hawks, hornbills, and buzzards. Fruit-eating and long-tailed pigeons nest in the jungles.

There are many especially large and beautiful species of butterflies. Termites, or so-called "white ants," are extremely destructive though there are some native woods that resist attack. Mosquitoes are thick and are responsible for the spread of malaria.

Fish are plentiful, and sharks abound. Turtles of several varieties are common.

The natives are Melanesians, but there are more than a few types and much intermixture is evident. On Bougain-

ville the natives are very black. On New Georgia and Choiseul they are nearly as black. On Santa Isabel, Malaita, Guadalcanal, San Cristobal, and Santa Cruz they are somewhat lighter, but types and shades vary noticeably on almost every large island. On the outlying islands to the east and north Polynesian blood predominates.

The Solomon Islanders are small and sturdy, though they are taller in the north than in the south. Their brows project over eyes that are dark and deeply sunk. Their noses are short but may be either straight or arched. Their lips are thick and their chins recede. Their hair, which is naturally very dark, is often dyed or bleached to a red or even a light tan. It is crisp and inclined to be woolly, but that is frequently hidden by being smeared with a mixture of lime which is considered decorative and is also useful to counteract lice.

These people have long had a bad reputation, in part deserved and in part not. They are—or until recently have been—cannibals. Possibly some still are. Infanticide is—or was—common. Headhunting was formerly common and still is practiced in the interiors of some islands. Massacres have often occurred in the past, and many white men have been killed by natives. Hardly more than thirty years ago an Australian scientific party of eleven men was massacred on Guadalcanal.

In northern Bougainville infants' heads are bound with fiber cloth almost immediately after birth, and the binding is kept on until their heads become definitely elongated. Elsewhere other unique customs are observed, and everywhere the native women are drudges.

Some of the tribes, at least, seem to believe in a good spirit who lives in a pleasant land, and in a bad spirit who lives in a volcano. They vaguely believe in a future life. Most of them are "followers" of the various missions, but how many understand Christianity it is hard to say. It has

been said that they are willing to be Christians because the Christian God is good, but that they still feel that they had best propitiate the numerous evil spirits in which they have always believed, and skulls on stakes still surround the "tambo" or devil houses of the interior villages.

Their language is similar to that of the natives of the Bismarck Archipelago, but many dialects are spoken and often one native is not understood by another who lives but a short distance from him. "Pidgin" English is therefore used considerably throughout the Archipelago.

The native villages are crude, and the huts are grass-walled and palm-leaf-thatched. The tambo house is always the most imposing structure and is surrounded by carved and burnt-out wooden figures mostly like sharks and crocodiles. These are devils—or gods. Vele is the "worst" devil.

Solomon Islanders chew betel nut and their lips are stained and their teeth are blackened as a result. Their ears are not merely pierced, but are slit so that objects of considerable size (a favorite is a 50-cigarette tin) are thrust therein.

Alvaro Mendaña is said to have discovered the Solomons in 1567 but saw only part of them. Then with Pedro de Quiros he organized an expedition in order to obtain the riches he thought were there and more of the islands were discovered.

Even as late as 1893 when the British began their control, there were only about 50 white men—mostly traders and missionaries—in the whole archipelago. Prior to that time the islands were unclaimed by any nation and many white "labor agents" who visited them were a low lot. Thus it often happened that the natives were badly treated. They were not infrequently kidnaped by scores and hundreds to be literally enslaved elsewhere. Their antagonism to white men, therefore, is readily understandable. In recent years

they have become less difficult to handle, for, under British supervision, they have been considerably treated and greatly benefited.

In 1899, a German-British arrangement assigned Bougainville, Buka, and Nissan to Germany, but during the First World War these were taken by the British. In 1920 they were assigned, together with a portion of New Guinea, to Australia as a mandate.

The resources of the islands are still small because of their limited development. Just prior to the outbreak of the Second World War the major exports of the islands were copra, trochus and green snail shells, timber, and ivory nuts, but the total of all exports for a year hardly exceeded a million dollars.

Their strategic importance is discussed at the end of this chapter.

The Bismarck Archipelago

Directly west of Bougainville and Buka at the northwestern extremity of the Solomons, lies New Britain, the greatest of the islands of the Bismarck Archipelago. The distance between the Solomons and New Britain is about 140 miles, but New Ireland, the second largest island in the Bismarck Group, overlaps New Britain on the east and is only 80 miles from Buka, with Nissan Island, another lesser member of the Solomons, closer still.

In geographic fact, in other words, these two archipelagoes might be considered one, but they have always been given two names and it is simpler so to divide them.

The Bismarck Archipelago consists of almost 200 islands and islets, but so many of them are little islets close beside their larger neighbors that they can be left out of consideration. The important islands of the archipelago, barring these insignificant and near-by fragments, are greatly less in number. The two large, crescent-shaped islands of New

Britain and New Ireland are so situated that their ends overlap by 40 miles or so. Twenty-mile St. George Channel lies between them at that point. Together the two form a vast, lopsided half-circle, with other islands at the ends of this and still others scattered along the coasts of the two great islands, sometimes near by and sometimes 40 to 50 miles offshore. A few groups lie at somewhat greater distances.

The major islands are as follows:

New Britain

Lesser islands off the north coast of New Britain: Lolo-bau, and the Vitu Group

Lesser islands off the west end of New Britain: Sakar, Umbai or Rooke, Tolokiwa, Long, Crown, Bagabag, and Karkar

Lesser islands off the northeast end of New Britain: Duke of York Group

New Ireland

Lesser islands off the west end of New Ireland: Dyaul, Lovongai or New Hanover, and a scattering of islets

Lesser islands off the northeast coast of New Ireland: St. Matthias Group, Tabar Group, Lihir, Tanga Group, and the Feni Group.

In addition there are the eighteen Admiralty Islands, which lie about 260 miles west of the western end of New Ireland. (Occasionally Bougainville, Buka, and Nissan, which in this chapter have been properly included with the Solomons, are listed as a part of the Bismarck Archipelago.) The others of this collection are the islets and the tiny offshore rocks many of which, even in smaller company, would call little attention to themselves and which, beside such large islands as New Britain and New Ireland, are especially unimportant.

New Britain

The island of New Britain, which lies just northeast of the eastern end of New Guinea, is a rough crescent with the concave side to the north and with the western tip somewhat farther south than the eastern. In length about 330 miles and nowhere more than 56 miles in width, this island has an area that has been variously estimated. Estimates range from 9,500 square miles to 13,000, but it is likely that the higher figure is the more accurate. A road of sorts crosses the island near its northeastern end where Wide Bay, on the eastern side, and Open Bay, on the west, narrow its width to 22 miles; but elsewhere the island has never been crossed except in three places—one near each end and one between Cape Beechy on the south side and Bangula Bay on the north. These crossings were made by government patrols and “no hostile natives were encountered.”

The coasts of New Britain are precipitous in some parts whereas in others, where the mountains lie farther inland, level coastal lowlands are edged by coral reefs. Considerable sections of the island are volcanic and there are several active volcanoes. The Whiteman Range runs the full length of the island, and is highest about midway of its length and from there toward the west. At least two peaks in this region exceed 6,000 feet. Ten miles southeast of Open Bay, however, and within 80 miles of the northeastern end of the island, a peak that ends a spur from the main central range reaches 7,546 feet, and is the island's highest mountain. This is an active volcano called The Father, near which are two lesser peaks known as the North Son and the South Son. Seventy-five miles to the northeast, and overlooking Blanche Bay and the harbor of Rabaul at the northeastern tip of the island, is a lesser active volcano called The Mother, which also has two lesser companions, called The North Daughter and the South Daughter. The Mother is

especially active and threatened the destruction of Rabaul in 1937. Another volcano, on Vulcan Island on the south side of Blanche Bay, erupted at the same time. The district was covered with ash and pumice, two Europeans and about three hundred natives were killed, and Rabaul was evacuated. Vulcan Island, which had been created in a single night in 1878 during a previous eruption of Mt. Mother, and which had been merely a low expanse of about 200 acres, became a 600-foot cone in 1937.

New Britain has several good harbors. Rabaul, or Simpson Harbor, which is connected with Blanche Bay is, except for the constant threat of Mt. Mother, the best. Jacquinot Bay is a wonderful expanse of water about 11 miles across, which, however, is exposed to winds from the east and southeast. Arawe, Linden, and Bla harbors are on the south coast, and Rein Bay, Stettin Bay, and Talasea Harbor are on the north coast. There are a few streams of considerable size and there are many that are short and swift.

It is the northeastern end of the island and the central and western portions of the north coast that are most developed. In this area roads have been built and 150 miles of these are fairly good. The plantations of the island are mostly in these sections, though a few are located near Gasmata and Bla Harbor on the south coast.

The vegetation of New Britain is luxuriant and heavy, and the usual tropical and subtropical fruits and vegetables are grown by the natives. Copra and cocoa, however, are the only commercial products.

Rabaul, on Simpson Harbor, is the governmental headquarters for the district and is the principal port of the archipelago. Most of the white officers, planters, and traders of New Britain are normally located in or near this town.

Its harbor may once have been a great volcanic crater which became broken at one side and consequently is connected with Blanche Bay. Its depth is good even close to

shore and it offers excellent protection for ships of any size. About the harbor lies a semicircle of mountains of which The Mother and The Daughters are a part. In fact, the town of Rabaul lies at the foot of The Mother.

Established in 1910 by the Germans, to whom the Bismarck Archipelago then belonged, Rabaul is well laid out and attractive. More a tropical garden than a town, it is shaded by poincianas that are planted not only along the sides of the streets but also down their centers. The government buildings are scattered among comfortably wide grounds. The bungalows—and most other structures—stand on concrete piles in order to protect them from the termites, and everywhere are gardens containing crotons, frangipani, and other tropical plants.

The volcanic eruption of 1937 did much damage, and, fearful of another eruption, the authorities were seeking for some better location for the archipelago's headquarters when the Japanese captured the islands in 1942. Rabaul is no more than a village, of course, but in these remote islands with their small population of white officials, traders, and planters, it is a place of some importance and almost the only one where the Western amenities are to be found. It is in the vicinity of Rabaul that most of New Britain's 75,000 cultivated acres are located. All this land except about 6,000 acres is "under" coconuts. About 2,500 acres are given over to cocoa.

Eighteen or twenty villages are dotted about New Britain's coast. Talasea, Gasmata, Pondo, and Lindenhaven are, perhaps, the most important of these. The last two have factories where coconut meat is dried.

The Lesser Islands off New Britain

The smaller islands that lie close to New Britain are of almost no importance whatever, and little more than their location and their size need be set down.

Lolobau, 4 by 8 miles in size, lies 6 miles offshore, 20 miles to the west of Open Bay.

The Vitu Group is made up of six islands and a few coral reefs which lie roughly 40 miles west of the tip of narrow Willaumez Peninsula which juts to the north for 38 miles from New Britain's northern coast. These islands are Narage, Undaga, Vambu, Mundua, Garove, and Unea. Garove is about 7 miles by 4 and has a large indentation on its southern side. It reaches an elevation of 984 feet, but the others are all far smaller and lower. They lie in a triangle approximately 30 miles on each side.

Off the west end of New Britain are the islands of Sakar, Umbai or Rooke, Tolokiwa, Long, Crown, Bagabag, and Karkar. Of these Umbai, Long, and Karkar are the largest, but they all lie in a chain that continues in the direction taken by the western end of New Britain. Umbai is the largest but no survey has been made of its coast line and neither its size nor its shape is exactly known. About 25 by 15 miles in size, it has a central peak that is about 4,500 feet in elevation.

Crown Island lies 40 miles west of Umbai with Karkar 90 miles farther on. Crown Island is 14 by 20 miles in size and Karkar 12 miles in diameter. Each one has a central peak that exceeds 4,000 feet.

In St. George Channel, which lies off New Britain's northeastern end and separates it from New Ireland, is the Duke of York Group. It consists only of an island 3 by 5 miles in size and a few scattered islets and rocks, which are within 16 miles of Rabaul.

New Ireland

New Ireland, which lies to the north of New Britain and extends from southeast to northwest, is 230 miles in length but is peculiarly narrow. Save at its southeastern end, where, for some sixty miles, it broadens to an extreme width

of 32 miles, it nowhere exceeds 15 miles in width and sometimes is no more than 6. It is mountainous throughout its length and even its narrow portion reaches an elevation, about midway of its length, of 4,100 feet. In the wider, southeastern portion one peak reaches 6,135 feet and within 20 miles of its southeast tip another reaches 7,054.

There are no streams of any considerable size, though there are many small, short, swift ones. Its coast line is seldom broken, and the best harbors are at Kavieng, at the island's northwest tip, at Namatanai, midway of the northeast side, and at Muliama which lies on the eastern side of the island's widest portion.

New Ireland may be crossed in a number of places and roads run its full length on the northeast side and for half its length on the southwest. Almost as much land is under cultivation on New Ireland as on New Britain, and the island is as densely covered with vegetation as is its larger neighbor.

The government agent for the whole island resides at Kavieng, which is an attractive little port 162 miles northwest of Rabaul. The town is on a ridge of coral rock, and the low country near by is under coconuts. Ships up to 2,000 tons can tie up at the Kavieng wharf.

The Lesser Islands off New Ireland

Near the narrow western end of New Ireland lies a considerable cluster of islands and islets. Lovongai, or New Hanover, is by far the largest and most important. Measuring approximately 20 by 35 miles in size, with a central peak 2,871 feet in elevation, Lovongai is fairly well developed agriculturally and has several thousand acres under coconuts. The villages of Nugima and Lovongai are on the island, which also has a few roads.

The other islands of the cluster are much smaller, though Selapiu, Binnigem, and Dyaul are partially developed.

Dyaul is 14 miles in length by a mile or two in width, and the others are much smaller.

The St. Matthias Group, which lie 50 miles north by west of Lovongai, contains two islands of some size and a scattering of islets. Mussau, 10 by 20 miles in size and with a central elevation of 2,130 feet, is the largest, and Emirau, 10 miles by 4, is the only other worth mentioning. They are almost wholly undeveloped and their population is apparently large though the number of natives is not accurately known.

The Tabar Group, Lihir Island, the Tanga Islands, and the Feni Group lie at intervals along the northeast coast of New Ireland in an irregular line 20 to 35 miles offshore.

Three islands form the Tabar Group—Simberi, Tatau, and Tabar. They lie north and south in a 25-mile chain, and Tatau, 6 by 10 miles in size and roughly triangular, is the largest. Tabar, about the same length and somewhat narrower, is more elevated, reaching a maximum height of 1,476 feet.

Lihir Island, 33 miles east by south, is somewhat larger, measuring 8 by 11 miles. It has a central ridge that reaches 1,640 feet and off its north end lie a few scattered rocks and islets.

Some 40 miles to the southeast are the Tanga Islands, Boang, Malendok, Lif, and Tefa. Malendok is the largest and measures 4 by 7 miles. Boang, 7 miles long and very narrow, lies just to the north of Malendok, and Lif, about two square miles in area, just to the south. Tefa is much smaller, and several even lesser islets are in the group.

The Feni Group is composed of three islands and they lie 40 miles south by east of the Tanga Islands. Ambitle, the largest, is 7 miles in diameter, with lesser Babase immediately off its northeast side. The third near-by island, Balum, is much smaller.

The Solomons island of Nissan, with its attendant but

lesser islands of Pinepil, Sirot, and Barahun, lies about 35 miles to the east, and the small Nuguria, or Fead, Group lies some 70 miles northeast of the Feni Group. Nugarba, Huhunati, and Sable islands, together with a scattering of lesser islets, make up this group of which Nugarba, some 12 miles in length, is quite the largest.

The More Distant Islands of the Bismarck Archipelago

The Admiralty Islands lie 160 miles west of Lovongai and, though they are about 800 square miles in total area, they are made up of one large island—Manus—and many small ones.

Manus is 52 miles by 12 and is rugged and mountainous, with saw-toothed mountains reaching 3,000 feet. It is densely wooded, and no white man had ever been into the interior until a government patrol crossed the island in 1927. There are 38 plantations on the island and about 24,000 acres are planted to coconuts. There is no other commercial crop, but the natives dive for trochus shell and "gold lip" pearl shell. Japanese shell poachers have frequently been in these waters in recent years and have greatly injured the shell beds. Manus has three ports—the villages of Lorengau, Bundralis, and Sopa Sopa. Kali Bay on the west end of Manus is large but is unprotected from westerly winds.

Rambutyo, or Jesu Maria Island, is second in size, and lies 38 miles east by south of Manus. It is 8 by 10 miles in size and the natives of the archipelago have long used obsidian from this island for knives and spear points. Half-a-dozen islets and a scattering of coral reef islets complete the group which is scattered over an area about 70 by 150 miles in extent.

The Ningo, Hermit, and Anchorite groups which lie 100 miles and more to the west of Manus, are all small coral islets or atolls with no harbors, and deep water close to their

shores makes anchoring difficult or impossible. The Hermit Group, the natives on which may possibly be related to those on the distant Caroline island of Yap, had the misfortune, or the bad judgment, years ago, to kill a German trader there. The German authorities, who then controlled the archipelago, punished the population so severely that even now only about 20 people live there.

*The d'Entrecasteaux, the Louisiade,
and the Trobriand Islands*

Just to the east and north of Milne Bay, at the uttermost southeastern tip of the great island of New Guinea, lies a complicated and numerous collection of islands and islets, of reefs and groups and rocks. The channels and passages, the lagoons and straits and sounds, form an immensely intricate nautical maze, while the islands and the islets, quite aside from the reefs and rocks, have no apparent order and little logical relationship one to another. It is a geographical tangle which would be all but insoluble were it not for the fact that not more than four or five of the islands are of any interest except to their savage inhabitants and to seamen who are forced to pass through this most difficult region.

Immediately to the north of this tip of New Guinea and only 15 to 30 miles offshore are the three greatest islands of this complicated grouping—Goodenough or Morata, Fergusson or Kaluwawa, and Normanby or Duau. These are the d'Entrecasteaux Islands. Goodenough is a high mountainous island some 16 by 22 miles in size, with a central peak 8,500 feet in elevation.

Four miles to the east of Goodenough lies somewhat larger Fergusson Island which is 20 by 38 miles in size. Much larger though it is, Fergusson is less elevated than Goodenough, though, near its northern coast, a peak reaches 4,500 feet. On the west coast and, more especially, on the

east coast are broad coastal lowlands, and running inland from the north coast is another section susceptible to agricultural development in which a good beginning has been made. Roads have been built, one of which crosses the island from the northern to the southern side.

The third of these islands is Normanby which is separated from Fergusson by a channel 3 miles wide. About 43 miles in length, Normanby is not more than 7 or 8 miles in average width, though the eastern end broadens to about 12. In this broader section a peak reaches 3,600 feet, but much of the narrow island is low, fertile, and, in part, occupied by plantations.

Lying so close to the vastly greater island of New Guinea, these islands are, in fauna, flora, and natives, essentially a part of it. Copra is the product of the plantations.

Fifty miles directly north of Fergusson Island is Kiriwina Island, one of the two largest of the numerous Trobriand Group. The rest, which number more than a score, are very small. Kiriwina Island is shaped something like a mushroom with a slightly crooked stem. It is 25 miles in length with the "head" about 6 by 10 miles in size, the "stem" being some 3 miles wide though at its lower end it broadens to 6. It has no important elevations, and the village of Losuia is located on Muiao Bay about where the narrow "stem" joins the "head" of the island. A road runs the island's full length.

The other large Trobriand island is Murua which lies 92 miles to the east and a little south of Kiriwina Island. It is the larger of the two and measures approximately 35 miles in length by a third of that in width, but its size is imperfectly known. The eastern half is much indented and the southeast section has two large bays, one of which is partly protected by a small offshore islet. The interior of this part of the island is hilly and reaches a maximum elevation of 1,300 feet. Kulamadau is the island's only considerable

village. The western portion—perhaps as much as the western half—is little known.

The Louisiade Archipelago, which was named in 1768 for Louis XV of France by the French explorer d'Entrecasteaux, lies a little over 100 miles east of the southeastern tip of New Guinea. It contains about 80 islands, but is greatly complicated by extensive and irregular coral reefs among which at most irregular intervals, most of these—some of which are coral islets—lie almost at random. Only three of the islands are of any considerable size. These are Misima, Tagula, and Rossel.

Misima lies closest to New Guinea, being 130 miles directly east of Milne Bay. It is about 26 miles in length by 1 to 4 in breadth and has a lengthwise ridge that reaches a maximum elevation of 1,435 feet.

Some 50 miles southeast of Misima is Tagula, a larger island extending fully 45 miles from east to west with a width of 6 to 10. It, too, has a central ridge, the main peak of which reaches 2,645 feet, and on the east and south sides it has a giant lagoon formed by a barrier reef which lies from 5 to 15 miles offshore. The reef is open at its western end but curves about the eastern end at a distance of 8 or 10 miles until it meets the northern coast.

Twenty-two miles to the northeast of Tagula lies lesser Rossel Island. It measures 7 by 18 miles in size and has an extensive reef, which lies close beside the island on the north and south but forms a large lagoon at the eastern end. A much larger one some 30 miles in length and 2 to 8 in width extends lengthwise away from the island's western end.

All the islands of these mosaic groups are rich in tropical vegetation. The islands that are inhabited readily grow all the usual tropical fruits and vegetables but, more important, gold was long ago discovered on Tagula and Misima islands. The deposits, however, are not extensive.

The natives are Papuans and, at least until recently, have

practiced cannibalism. Not long after the First World War a ship carrying 300 Chinese was wrecked on Rossel Island, and though their fate has never been positively learned, their utter disappearance can be logically explained only by assuming that they were eaten.

These islands are a part of the Territory of Papua.

In a region so diverse as that including the Bismarck Archipelago and the islands to the east, the climate naturally differs somewhat. Throughout the area, however, the climate is moist and tropical except at high altitudes. At Rabaul the average annual rainfall is 87 inches though elsewhere in the region it surpasses 275 inches.

There is no cool season, though the season from March to November, when the wind is inclined to blow from the southwest, is less hot than from December to February when the northwest monsoon blows. There are no dry belts and extended droughts are unknown. At Rabaul the mean temperature is about 81 degrees with a maximum of 100, or a very little above, and a minimum of 61.

Malaria offers a serious problem and some work has been done to clean up the mosquitoes, but it still has far to go. Dysentery is widespread. Tuberculosis, leprosy, and elephantiasis are not uncommon among the natives.

Lying between New Guinea and the Solomons, the Bismarck Archipelago has flora related to both. The dense tropical jungles contain all the trees that are found in the Solomons, and the eucalyptus, so common in New Guinea, is also present. Where conditions permit, mangrove swamps are to be found but they are less common than in the Solomons. Palms of many varieties are numerous. The usual tropical food plants are readily grown, but commercially the coconut is almost alone, cocoa playing a very small part.

These islands are as poverty-stricken in indigenous land

mammals as are the other near-by regions, though all the animals of the Solomons are known. Rats, bats, wild pigs and wild dogs, mice, a few squirrels, and some marsupials are to be found. There are many species of birds, but no birds of Paradise, which are so remarkable a part of New Guinea bird life, are known.

Turtles, frogs, toads, and crocodiles, as well as snakes, of which some are poisonous, are common. Butterflies, some of which are of great size, are found on most of the islands, and in many places mosquitoes are a serious pest.

The natives are Melanesians with intermixtures of other strains. On the larger islands the Melanesian and Papuan (New Guinea) types predominate, but in the Admiralty Islands there is some Micronesian blood. In the eastern portions of the archipelagoes some Polynesian influence is seen.

In the neighborhood of Rabaul, where the natives have been most closely studied, they are brown and the males average about 5 feet 6 inches in height. Their arms and legs are long, their feet are large, and their weight is in the neighborhood of 110 to 120 pounds. They are not muscular but are wiry. Not suited to heavy continuous labor, they are enduring under certain activities, and are tireless on the trail. Their intelligence is low, and they are morose and inclined to sulk.

The native women are even lower in intelligence, but their morals are good. Abortion is commonly practiced, however, and mothers seldom have more than two or three children. The women do the gardening, the harvesting, and the marketing of the crops, while the men hunt, fish, and prepare the gardens. Sons do not inherit their father's land but, upon his death, become a part of the mother's family. Formerly polygamous, they are gradually dropping the practice.

Cannibalism has been practiced on the islands until fairly

recently. Possibly it may continue on a small scale in the interior of New Britain and elsewhere, but if so the fact is not positively known. They believe in many spirits, and almost everything—even inanimate and some artificial objects—is supposed to have its spirits. Special spirits control the elements, and bad spirits bring sickness and other misfortune—such as bad luck in fishing and hunting.

Their food is principally vegetable—yams, taro, sweet potatoes, bananas, and coconuts. Fish and pork are counted almost as luxuries. Fowls and dogs are eaten only on certain special occasions.

The various dialects of both the Bismarck Archipelago and the Solomon Islands are mostly Melanesian though many of them differ so much as not to be understood by speakers of other dialects. Their speech, however, is all somewhat euphonious and consonants do not come together except with “ng” and “mb.” Among some of these dialects, at least, one word—“na”—changes a statement to the future tense. Another—“tara”—changes it to the past tense. Thus their expression for “you come” becomes “you will come” when “na” is added, or “you came” when “tara” is included. This simplification of the tenses makes it not too difficult to pick up a little of the language, for only the present tense of verbs, plus those two words, need be learned.

Discovered during the period in which the Dutch strenuously objected to permitting any “interlopers” to enter the region of “the Spice Islands” which they so largely controlled, the Bismarck Archipelago as well as the Solomons had almost no contact with Europeans until the nineteenth century was well advanced. Even then little was done except by a few adventurous traders and missionaries and, to the impairment of the islands, by “black birders” who raided these and other islands in search of what was prac-

tically slave labor for distant plantations elsewhere in the South Seas. It was, as a matter of fact, the activities of these unpleasant folk that caused Britain to interest herself in the Solomons, and later Germany, looking about for an "empire," laid claim to the Bismarck Group.

The German flag was first raised in this region in 1884 when it was run up on a part of New Guinea, and in 1885 the Bismarck Islands were included in their claim. Some exploration among the islands was carried on into the 1890's and finally the development of the region began, though the delay is illustrated by the fact that Rabaul (then Herbertshöhe) was not founded until 1910.

Immediately after the outbreak of the First World War the entire region that was under the flag of Germany was seized by the British, and in 1920 all this territory was assigned under mandate to Australia. Most of its development, which even yet is only fractional, has taken place since then.

Economically the Solomon Islands, the Bismarck Archipelago, and the other islands of these crowded seas have never played a large role in the world's history, and strategically they have apparently played almost an equally small part except in the minds of the Japanese. It now is plain, however, that, properly fortified and defended, they can form, with New Guinea and the other great islands of the East Indies, a protecting shield between Australia and any enemy in the north. Or, as has become apparent, they can, in the hands of such an enemy, threaten the security of Australia, New Zealand, and many of the other territories of the south Pacific. Strategically, therefore, they have assumed an important role before they have even begun an economic growth of any account. Ultimately, perhaps, they may be of value in both fields.

CHAPTER NINE

The Caroline, Marshall, and Palau Islands, the Marianas, Ogasawaras, and Wake

JUST NORTH OF THE EQUATOR in the western Pacific lies a very extended archipelago. These are the Caroline Islands which, at their western end, include the Palau, or Pelew, Islands, and at their eastern end almost merge with the 33 coral atolls of the Marshall Group. Fully 2,600 miles from east to west, and about 500 in greatest width, these three groups include a large number of islands, the total area of which is remarkably small. The number of islands in these groups is variously estimated depending, apparently, on the observers' ideas of what constitutes an island. If every islet is included the total reaches a figure close to 1,400. If closely related islets lying on a single reef are considered as one "island"—and this is standard practice among most of the Pacific atolls—the number is about 600. But in either case these many islands total about 700 square miles in area. This figure, however, is misleading, for the area of the 33 atolls of the Marshall Group is about 160 square miles, and the four main islands of Ponape and Kusaie in the eastern Carolines, Truk in the central, and Yap in the western, together make up 307 square miles more. In addition, the 26 islands of the Palau Group cover 175 square miles. Thus it appears that about 60 square miles of area must be divided

among some 500—or, if you prefer, 1,300—of these Caroline Islands.

On the other hand it must be clear that the problem of determining with any accuracy the area of so enormous a number of small islands is well-nigh impossible, and the figures given above no doubt are somewhat in error. Nevertheless, even granting a considerable margin for inaccuracies of measurement, it must be clear that few of these equatorial islets are of any importance. Most of them are not only uninhabited, they are also uninhabitable.

The islands have been held by Japan since 1920 under a mandate from the League of Nations the terms of which, it has long been apparent, and particularly the terms requiring that the islands remain unfortified, have not been adhered to. Their administration is in the hands of the Director of the South Seas Bureau with headquarters at Koror, Palau. District governors are located at Yap, Truk, Palau, and Ponape.

In all this immense collection of islands and islets only a few are worthy of notice. Since the Japanese took over their control only the most fragmentary information about them has been permitted to appear; in fact, almost no one not Japanese has been permitted to visit them. Such development as has taken place has been incompletely described or has not been described at all, and even the reports formerly made to the League of Nations have been stopped. Thus present-day knowledge of these islands is limited mostly to what was known of them prior to Japanese occupation.

The large islands of the Carolines—Palau, Yap, Truk, Ponape, and Kusaie—are volcanic, though they are surrounded by complicated coral reefs. The others of the archipelago are coral islets, and though many of them are widely separated they are not scattered at all evenly about the sea. Instead, they are grouped together in about forty clusters,

some of a few and some of many islets, some closely connected and some more widely separated. But all of them except the volcanic islands, on which are relatively high elevations, are low and small and narrow, as is typical of the lesser coral islets throughout the whole Pacific.

The Palau (Pelew) Islands, though not actually the westernmost islands in the Japanese mandate, are certainly the westernmost islands of importance. To the south and west of them lie only half-a-dozen islets and reefs of little consequence, and 500 miles directly west lies Mindanao, the great southern island of the Philippines.

Between 7 and 8 degrees north of the equator and 134 degrees east of Greenwich, the Palau Islands are a reef-surrounded chain of volcanic islands stretching 90 miles from north to south and 20 miles in width. The group is said to contain 26 islands, although, if every little coral islet that breaks the surface were to be included, there would be greatly more. There are, however, only half-a-dozen islands of any size, and of these Babelthuap Island (or Palau, or Babelthaob, or Baberudaobu) is the largest. Twenty-seven miles from north to south and 8 miles in greatest width, it has a thin peninsula less than a mile in width extending $7\frac{1}{2}$ miles northward as its northern portion. It is completely surrounded by a fringing reef, and the barrier reef of the group lies 3 to 10 miles off the island's western side. The island is abrupt but not very high. Its greatest elevation lies close to the shore on the island's western side and reaches 643 feet. The town of Gabokkudo is on the narrow northern peninsula, and the town of Mukeru is on the southeast side. Another town—Marukiyoku—lies on the island's eastern shore.

South of this main island, and curving off to the southwest for 40 miles, lies a string of smaller islands which, mixed with a coral reef and many coral islets, form, with Palau Island itself, the eastern side of the group's large la-

goon. Koror Island is one of the first of these and it is here that the Japanese headquarters for the entire mandate is situated. Koror (or Kororu) is very small and closely surrounded by reefs and lesser islets. About 3 miles to the southwest lies larger Malakai (or Marakaru) Island, some 8 miles in length but narrow and irregular. Makarakaru (Eil Malk) comes next and then, for 10 miles, a maze of reefs and islets at the end of which, and marking the southern end of the reef, lies Peleliu (or Periryu), an island 2 by 5 miles in size. Seven miles farther to the southwest, and outside the reef, lies lesser Angaur, which is important to Japan because of its deposits of phosphate rock. These, however, are small compared with the British phosphate deposits on Ocean and Nauru islands.

The Palau Islands lagoon is formed by the reef which runs irregularly the length of the group for 55 miles from Peleliu Island to beyond the northern tip of Palau, and lying fully 10 miles to the west just opposite Koror.

The volcanic islands of this group, as well as the coral islets, are heavily covered with trees and other vegetation, but the details of the island's development since 1920 are unknown. That the great lagoon has been much "improved" is certain, and it is known that a canal has been cut somewhere leading into some "inner harbor" which has a pier about a quarter of a mile long. A portion of this inner harbor is held exclusively for the uses of Japanese warships, but no other details of it are known.

Ruins of ancient stone structures are on Palau and other islands of the Carolines, but they have never been satisfactorily explained.

The island of Yap (or Uap) lies about 225 miles northeast of the Palau Group, and is really a tightly packed cluster of four islands separated by long channels, many sections of which are less than a mile in width. All of these islands are rugged, broken, and covered with forests of

coconut and arica palms, bamboos and crotons. One of the most beautiful of the Carolines, it is fertile and productive, with tropical fruits and vegetables growing in great abundance. Extending 15 miles from north to south and 6 in greatest width, these four islands have fringing coral reefs upon their shores and a barrier reef lying a mile or so offshore, creating a narrow and irregular lagoon that practically surrounds the islands. The greatest elevation is 585 feet.

A trans-Pacific cable from San Francisco by way of Hawaii, Midway, and Guam, has a station on Yap where it branches to Shanghai, China, and to the Dutch East Indies.

The natives of Yap are widely known for their strange "money." In addition to shell money, they have quarried, at great effort, huge calcite or limestone discs on the Palau Islands and have brought these across to Yap. These discs vary in size, but some are 6 to 12 feet in diameter and weigh up to nearly five tons. Naturally this "money" does not circulate, but is piled up around the chief's treasure-house and seems to be regarded as public property. The discs seem to be tokens of a sort, though they appear to be kept for show rather than for use.

Fully 925 miles east of Yap and a little to the south is the great reef-surrounded lagoon that contains the islands that make up Truk. This "island" is supposed by some observers to be the greatest naval base in the Pacific except for Pearl Harbor, but the details of its installations are not known except to the Japanese.

The extended coral reef that surrounds the 11 major islands and the many islets of the group, extends 40 miles from east to west and 38 from north to south, and another lesser reef 2 miles to the south surrounds a lagoon 13 miles by 3 or 4, which, however, contains no islands.

There are four principal passes through the reef into the

inner security of the large lagoon, within which, and extending from near the western to near the eastern sections of the reef, are the six main islands and the many lesser ones that make up this mid-sea naval base.

None of these islands is large, though the irregular, U-shaped Tol Island measures 10 miles along its sharply curved extent and is about 3 miles in greatest breadth; while another—Moen—is roughly triangular with one side about 5 miles in length and the others each about 4. These two, however, are the largest, but four islands have peaks over a thousand feet in height and a fifth approximates that figure.

On 3-mile Natsu (or Dublon, or Toloas) Island there is said to be an airfield, a town, and a radio station, while this island and near-by Uman and Fefan form a triangular anchorage that is supposed to be that of the all-important naval base. Fortifications are supposedly heavy and complete.

Ponape, by far the largest single island of this extended archipelago, lies 410 miles directly east of Truk. It is a much-indented island 12 by 15 miles in size with a surrounding barrier reef lying 1 to 3 or 4 miles offshore. Within this reef, on the northern side of the island, are half-a-dozen small islands, and a few other islets lie close to the shore. The island is amazingly rugged, with steep peaks and sharp ridges, deep valleys and vertical cliffs, and with heavy growths of coconut and arica palms and other tropical vegetation everywhere except on the rocky faces of the vertiginous precipices.

Long ago American whalers frequently called at Ponape for fresh water, its steep valleys being well supplied with streams, and the protected anchorage that lies in the shadow of the perpendicular 900-foot cliff on the little island of Jokaj (or Jokaji) was a favorite then, as it has come to be now for the Japanese Navy. It is here, on the north side of

Ponape, that the Japanese installations have apparently been made.

One peak within 7 miles of this anchorage reaches 2,038 feet, while another near the center of the island measures 2,579.

The steep interior is uninhabited, though many unexplained and very ancient ruins are located there.

Three hundred and thirty miles east-southeast of Ponape lies the smaller but otherwise similar island of Kusaie. Sometimes called Valao or Strong's, this island measures 6 by 9 miles and has a central peak—Mt. Crozer—2,064 feet high, and another near the northern coast—Mt. Buache—of 1,946 feet. At least three other peaks surpass 1,500 feet. Entirely surrounded by a fringing reef which, on the northwest coast, turns out a little way to form a barrier reef and a small lagoon, Kusaie has three harbors: one on the northwest, one on the south, and a third—the largest and best—on the east.

This easternmost island of the Carolines lies about 2,850 miles west-southwest of Pearl Harbor and Honolulu, while Wake Island lies almost exactly 1,000 miles to the north-northeast.

Aside from these major islands of the Caroline Group, few are of importance.

The Pingelap Group, 160 miles west by north of Kusaie, is made up of three small islands on a single reef with a population of about 100. Sixty miles northwest of the Pingelaps are the three small Mokil Islands, which have about 200 inhabitants. A dozen miles west of Ponape are the 14 little islands called, collectively, the Ant or Anto Islands. One of these—Ngatik—is largely populated by the descendants of a shipwrecked American Negro who collected several native wives and settled there.

Southeast of Truk about 160 miles are three clusters

called the Lukunor or Rukunoru, the Satawan or Satoan or Satouwan, and the Etal, or Etaru groups. Together, these three groups contain about 100 little islands, with a total population of approximately 2,000.

Between Truk and Yap lie many groups and clusters, among the most important of which are the following:

Satawal, or Sasaon, or Tucker

Lamotrek, or Namochikku

Pikelot, or Pigerotto

Ifalik, or Furrukku

Faraulep, or Furaarappu

Fais, or Feys, or Tromulin

The native population of the Caroline Islands was estimated, some thirty years ago, to be 36,000, and in 1934 the Japanese made an almost identical estimate. In the meantime, however, many Japanese had entered the archipelago. In 1932 their number was said to be 6,016. By 1935 an apparently reliable report gave 11,652 as the figure. Since then no figures have been published.

The Marshall Islands

A sort of eastern continuation of the Caroline Islands though they are, the Marshall Islands are different in certain characteristics. There are only 32 of them, but each one is a true atoll—a great island-dotted reef surrounding a large inner lagoon—and most of these are somewhat widely separated from the rest. In addition to the atolls there are an estimated 867 reefs, but these are not properly to be included among the islands.

Extending in two roughly parallel chains about 700 miles in length and running from the northwest to the southeast, these atolls are sometimes 100 miles or more from their nearest neighbors. The western chain is called the Ralik, or Sunset, Chain and the eastern, roughly 100 miles away, is the Radak, or Sunrise, Chain.

From northwest to southeast, though the chains are most irregular in their formation, the atolls are as follows:

Ralik Group	Radak Group
1. Eniwetok	1. Bikini
2. Ujelang	2. Rongelap
3. Wotho	3. Ailinginae
4. Ujae	4. Rongerik
5. Lae	5. Bikar
6. Kwajalein	6. Utirik
7. Lib	7. Taka
8. Namu	8. Ailuk
9. Jabwot	9. Mejit
10. Alinglapalap	10. Likiep
11. Jaluit	11. Jemo
12. Kili	12. Wotje
13. Namorik	13. Erjkub
14. Ebon	14. Maloelap
	15. Aur
	16. Majuro
	17. Mili
	18. Narik

These atolls vary greatly in size, but with four or five exceptions they are all large. In every case, however, the islets that lie on these enclosed reefs are narrow, rarely exceeding 200 yards in width. Neither are they at all elevated, the highest point in the group (which is on Likiep) being no more than 33 feet above the sea.

Jaluit is an atoll 38 miles north and south, by 21 east and west. It is irregularly quadrilateral in shape, with most of the islets on the southeastern and northeastern sides. One of these is fully 12 miles in length.

Almost the entire western side of the atoll is mere water-washed reef, in the entire length of which there is only one pass. Another pass is on the northeast side and a third on

the southeast. The administrative headquarters for the group is at the village of Jabur, which lies beside the south-east pass.

The surface of these islets is covered with coral sand which, here and there, has acquired a topsoil by the decay of vegetation. Vegetation is poor, though coconut palms, breadfruit trees, some bananas, yams, pandanus, and taro grow. The lagoons are filled with fish.

The population of these islands was said, in 1935, to consist of 481 Japanese and 9,953 natives. The most populous island—at least, formerly—was Majuro, with about 1,600 people.

The climate throughout all these mandated islands, from Palau to the Marshalls, is moist and hot, though it is healthful. Toward the west storms are not infrequent, though they are less so in the Marshalls, where easterly winds prevail all the year. Though all these islands lie north of the equator 5 to 12 degrees, the Marshalls have their highest temperatures in January and their lowest in July, although the variation from the annual mean of about 80 degrees is never great.

The flora of the larger and more elevated islands is not greatly different from that of the greater islands south of the equator, and the low coral islands are in most botanical respects identical with the Gilbert Islands, though many of the western Carolines have somewhat more vegetation.

The fauna of the islands is limited, as is usual throughout the Pacific. Mammals, except for rats and bats—and not even bats exist on the lesser coral islands—are apparently confined mostly to dogs and pigs which have been introduced. Land birds are uncommon, and few reptiles, except on the elevated islands, exist. Fish, however, are plentiful about all these islands.

The people are Micronesian hybrids, and show some Papuan, or Melanesian, influences. This is most marked in

the Palau Group. Elsewhere in the Carolines and in the Marshalls they are brown in color and of good physique, with comparatively high mentalities. They are good agriculturalists, excellent boatbuilders, and remarkably good navigators. In the Marshalls they make "charts" of strips of wood bound together with fibers. Some of these show the positions of and distances between the islands and some show the direction of the prevailing winds. Their canoes are often made of the wood of the breadfruit tree and they carry sails.

Customs differ somewhat, but in the Marshalls there are four classes, only two of which are permitted to own land.

From the sixteenth century, when (in 1527) the first of them were discovered, these islands were claimed by Spain, though little or nothing was done to control or develop them. In 1885, Germany made several claims, some of which were disallowed by an arbitrator, but following the Spanish-American War, as a result of which Spain lost the Philippines and Guam, the remaining islands were sold to Germany for about \$5,000,000.

During the First World War they were taken over—in part, at least—by Japan, and later, though the United States made known her wishes to obtain Yap as a cable station, were made a mandate and placed under Japan's control. There is no doubt that Japan, after she withdrew from the League of Nations, considered them her property.

The Marianas, Mariannes, or Ladrone Islands

Five hundred miles northeast of the island of Yap, and 1,450 miles directly east of Manila, in the Philippine Islands, lies the island of Guam, the largest and southernmost of the 15 Marianas, Mariannes, or Ladrone Islands. This group is 500 miles or so in length from south to north, and lies in a fairly regular curve. All the islands are ele-

vated, and the northernmost ten are volcanic in origin, the southern five being coralline limestone islands. Six of the lesser northern islands are (or were just prior to the First World War) uninhabited.

Guam is the largest of the group and is the only one that belongs to the United States. The others form a part of the same Japanese mandate that includes the Carolines, the Palaus, and the Marshalls.

The Island of Guam

Lying 145 degrees east of Greenwich and $13\frac{1}{2}$ degrees north of the equator, Guam is 30 miles from its southern to its northeastern tip and 8 miles in greatest width. Narrowing to a width of $3\frac{1}{4}$ miles just to the north of its center, it widens toward both ends, with the southern portion somewhat larger than the northern. On the west side of the southern half a peninsula about a mile wide projects into the sea for $3\frac{3}{4}$ miles, and 2 miles to the north, little Cabras Island, 2 miles long by about a quarter of a mile in width, serves, together with an area of reef, to enclose Apra Harbor, or Port Apra. The capital of the island, however—Agana—lies 4 miles east of Cabras Island on Agana Bay, which is much less protected than Apra.

The southern two thirds of the island is somewhat rugged, with many high hills, several of which exceed 1,000 feet in height. These hills are somewhat barren in appearance, though the valleys are well watered and are heavily wooded. Five streams in this portion of the island flow to the east, three of them from points within 2 miles of the western coast.

The northern third of the island is mainly a plateau from 300 to 600 feet high. No streams exist here, and both the east and west coasts of this portion of the island are abrupt and consist of bluffs and headlands. The southern portion of the west coast contains a strip of rolling lowlands behind

which the hills rise sharply. The southeastern coast is lined with bluffs except where the island's streams have eroded their valleys. Coral reefs fringe much of the coast.

Agana is a town with a population of 10,004, and is an interesting mixture of palm-thatched native houses, heavy stone, Spanish buildings, and new, bright, and thoroughly modern American structures. It has all the modern conveniences of the ordinary American town, together with simpler structures and methods of an earlier day. Other towns are Sumay, which lies on the small western peninsula, Merizo, on the southwest end of the island, and Piti, the port of entry, on Apra Harbor. The island was never adequately fortified.

The total population of Guam (1940 census) is 22,290.

The climate of the island is agreeable and healthful. From December to June is the season of the northeast trade winds, and rainfall is light. During the rest of the year the monsoon brings a rainy season. Typhoons are occasional and earthquakes are sometimes felt.

The island has long produced coconuts, rice, sugar, coffee, and cocoa, and the U. S. Department of Agriculture has added many new agricultural products. Corn, sweet potatoes, bananas, pineapples, citrus fruits, limes, mangoes, papayas, breadfruit, yams, tobacco, cassava, kapok, and alligator pears have all been introduced, and are normally exported. About 70 per cent of the island is forested, and some timber is produced. Both cattle and water buffaloes are raised. The indigenous fauna is limited and is similar to that of the Carolines.

The natives of Guam—and of the other Marianas—call themselves Chamorros. In their earlier development they were of Indonesian stock. During centuries of Spanish domination, however, the natives were greatly reduced in number and the remainder became much intermixed with Filipinos brought to the island by the Spaniards, as well as

with the Spaniards themselves. There are now few pure-blooded Chamorros.

The aborigines were almost chocolate in color, and strenuously opposed Spanish domination. It was because of this that the Spaniards used such harsh methods in putting them down, many being killed and many others leaving the islands. Little attempt was made by the Spaniards to learn anything of the natives' culture, and their past is not adequately known.

The Lesser Marianas

North of Guam lie the four other coralline limestone islands of Rota, Agiguan, Tinian, and Saipan. The first two of these are small, Rota being 12 miles long by $3\frac{1}{2}$ to 4 in width, and Agiguan only $1\frac{1}{2}$ miles by 3. Neither has apparently been much developed, though Rota has had some attention. The next two, however—Tinian and Saipan—are much more important. The Japanese, without announcing to the world just what they have accomplished, could not hide completely the considerable preparations they have made there to convert these islands into a naval base.

Tinian Island, about 13 miles by 6, is the lesser of the two, both in size and in importance. It is 15-mile Saipan that has been mostly developed. About 4 miles in width, but narrowing toward its northern end, Saipan has two short peninsulas on its eastern side—one midway of its length and one at the southern end—between which lies Magicienne Bay, which is $2\frac{1}{2}$ by 2 miles. On the western side of the island is a lagoon between the island and a coral reef. With these natural advantages, the island could be—and undoubtedly has been—made into a fairly strong naval base.

The islands to the north are all much smaller and less important, though some of them surpass in elevation either Saipan, whose major peak is 1,554 feet high, or Guam.

Little is known of these Japanese-held Marianas. Their natives are the same as those of Guam; the islands are forested to much the same degree; and the climate is the same.

It is believed that at the time of the Spanish occupation in 1668, 40,000 to 60,000 Chamorros lived on these islands. A century later only 1,800 remained. They were somewhat typical Micronesians, but their much intermixed descendants are not.

The islands were discovered by Magellan in 1521 when he sighted Rota and Guam. Magellan named them *Islas de las Velas Latinas*, or the Islands of the Lateen Sails. Because some of the natives stole certain articles from the crew of the discoverer's ship, however, they referred to the islands as *Islas de los Ladrones*, or Islands of the Thieves, and the name has been used ever since. In 1668 they were named *Las Marianas* in honor of Maria Anna of Austria, the widow of Philip IV of Spain, and this "new" name is now somewhat more in use than the older one.

The Marianas, except for Guam, which was taken from Spain by the United States in 1898, were sold by Spain to Germany, and, after the First World War, became a part of the great Japanese mandate that included the Carolines.

The Ogasawara or Bonin Islands

Northwest of the northernmost of the Marianas about 335 miles, and 125 miles northeast of the three high but small uninhabited Kazan or Volcano Islands of Kita Iwo, Iwo, and Minami Iwo, lies the southernmost of a little archipelago called the Ogasawara or Bonin Islands. There are 20 of them with a total area of 29 square miles, and they lie in a slightly irregular line about 250 miles in length almost directly north and south, with Nishino well out of line to the west. The ten largest (the others being mere islets) are named, from north to south, as follows:

Muko Shima (Bridegroom Island)
 Nakadachi Shima (Go-between Island)
 Yome Shima (Bride Island)
 Ototo Jima (Younger Brother Island)
 Ani Shima (Elder Brother Island)
 Chichi Jima (Father Island)
 Haha Jima (Mother Island)
 Mei Jima (Niece Island)
 Ani Jima (Elder Sister Island)

Chichi Jima was called Peel Island in the report of Commodore Perry in 1853 when he urged the establishment of a coaling station there at "Port Lloyd," the chief anchorage. This harbor is, apparently, the crater of an extinct volcano, the islands all being of volcanic origin, and has now been made into a minor naval base by Japan.

Originally called the Bunin Jima or Bunin Islands, and from that called the Bonin Islands by foreigners, they were apparently entirely uninhabited until, in 1830, two Britons, two Americans, a Dane, and a few Hawaiians, went to Peel Island. They hoisted the British flag, but Britain never claimed the islands, and Japan later took active charge of the entire group. Their population now exceeds 4,500.

The islands are rugged and hilly, with sharp peaks and crags, though without great elevations. The vegetation is almost tropically luxuriant. Palms, wild pineapples, and ferns are numerous. Cedar, rosewood, ironwood, boxwood, sandal, and white oak are numerous.

The shores are covered with coral. Earthquakes are common, and the sea, as if affected by submarine disturbances of great force, sometimes rises high up the sides of the islands, or withdraws sharply from the shores, without, however, forming tidal waves.

The climate is more nearly tropical than temperate, but

little else is known about the islands, for the Japanese have consistently discouraged visitors.

The Ogasawara Islands which, in a way, are a kind of northward continuation of the line of the Marianas, themselves lead toward a group of islands close to the coast of Japan—the Shichito Islands. Thus from Guam to the immediate vicinity of Yokohama there is an almost continuous chain of islands and islets some of which may be—and probably are—equipped as strong naval and air bases. Thus just as the Carolines form a shield protecting Japan from attack from the south, the Marianas, the Ogasawaras, and the Shichito Islands are a similar guard against attacks from the east. From Yokohama south, in other words, these many small islands may be used as “unsinkable aircraft carriers” in the defense of the main Japanese Islands. It is only to the north of Yokohama that such mid-sea defenses fail to exist, for though Japan’s little counterpart of Wake Island—Marcus—lies 700 miles due east of the Kazan Islands, and about the same distance northwest by west of Wake, no other Japanese islands lie in any other part of the North Pacific east of their own home islands.

Wake Island

Lying 480 miles directly north of the northernmost of the Marshall Islands and 1,500 east by north of Guam is the formerly uninhabited little American island of Wake. Few islands in the Pacific are so isolated, for there is literally nothing for hundreds of miles about it in any direction to break the surface of the ocean; and Wake is but a small island, with no portion of its surface more than 21 feet above the sea.

Actually Wake is made up of three closely grouped sandy islets, the largest of which is separated from the two smaller islets by channels so narrow as hardly to matter. One of these is no wider than a boy might throw a stone

while the other measures no more than about 300 yards. Thus these three islets are practically one and lie in the form of a V. In fact, the largest of the three islands is itself a V—a more perfect one than are the three combined. The other two are mere continuations of the V's two arms, though the continuation of the right arm is somewhat out of line owing to the fact that the upper part of that arm, just before it reaches the point where the 300-yard channel separates it from the lesser island beyond, curves sharply inward for a few hundred yards.

From the sharp point at the bottom of the V across the sandy island to the lagoon within is almost exactly 1 mile. The right arm averages about one half a mile in width, and the left arm a trifle less, while the right arm is 2.8 miles in length and the left is 2.9 miles.

The smaller island that continues the left arm is straight, 1.3 miles long, and slightly less than a quarter of a mile wide. The continuation of the eastern arm is 1.5 miles in length and varies in width from one to three tenths of a mile wide, though a sandbar about three tenths of a mile long and a hundred yards or so in width projects from the little island's side out into the central lagoon.

All along the outside shores of these three islets is a fringing coral reef which, turning across the open end of the V, becomes a barrier reef between the arms—a distance of about $1\frac{1}{2}$ miles. The whole completed V, in other words, has arms 4 miles in length with their upper ends spread $1\frac{1}{2}$ miles apart.

Between these arms, and protected by the barrier reef that lies there, is the lagoon, which is about $4\frac{1}{4}$ miles in length from the barrier reef down to the "bottom" of the V.

The name Wake, though it is properly used in relation to all the land of this little mid-sea island, more specifically applies to the V-shaped islet. The lesser islets have names

of their own—Peale for the eastern and Wilkes for the western. It was on Peale Island, in 1936, that Pan-American Airways built their comfortable little 45-room hotel for the accommodation of trans-Pacific air passengers.

Shrubs and trees are scattered about somewhat abundantly on Wake, most of the trees being beach magnolias. There is little grass. The island abounds in sea birds—boobies, terns, frigate and boatswain birds, and many flightless rails. There are many furry, short-tailed rats, and innumerable hermit crabs.

Wake lies 19 degrees and 20 minutes north of the equator, and 166 degrees and 35 minutes east of Greenwich. Its climate is tropical but the heat is tempered by the sea, and the island lies within the region of the northeast trade winds. Violent storms are rare.

The American flag was hoisted on Wake Island on July 4, 1898 by General F. V. Greene, commanding the Second Detachment Philippine Expedition. It was never fortified, but a small body of Marines was formerly stationed there.

This small lone island midway of the Pacific had, before war engulfed it, become an important link in the trans-Pacific airplane route. Now it has also been shown to be of greater strategic value than its limited size might suggest.

CHAPTER TEN

The Great Islands of the Shallow Seas

LYING BETWEEN THE CONTINENTS of Asia and Australia, and extending from Sumatra and its fringing islands on the west to New Guinea and its surrounding smaller neighbors on the east, is the most gigantic archipelago on earth. Extending from the 95th meridian of east longitude to the 151st, and from the 7th parallel of latitude north of the equator to the 11th south, this region measures approximately 4,000 miles east and west by 1,200 north and south.

The natural resources of these islands are among the greatest in the world. Their people number somewhere in the neighborhood of sixty million. The single island of New Guinea extends 1,500 miles in length and its area is 342,000 square miles, while Borneo is not greatly smaller. In fact, the area of the islands of this region combined approximately equals that of the United States east of the Mississippi River, and the island of Java is the most densely populated area of size in all the world.

So vast and complex a region obviously cannot be adequately covered in a single chapter of any book, and it is not the purpose of this volume seriously to attempt that task. These islands are hardly to be considered "islands of the Pacific," but lie, instead, between the Pacific and the Indian Oceans. Nevertheless, they are closely connected

with the Pacific, and on that account this chapter devotes itself somewhat superficially to their major features.

Large sections of the seas and straits, the gulfs and inlets that surround these islands are very shallow. The waters between the Malay Peninsula, Sumatra, Java, and Borneo nowhere exceed 100 fathoms in depth. The sea between New Guinea and Australia is similarly shallow. Between these two areas of shallow water, however, deeper waters lie.

During the ice age, when so large a part of the waters of the world were tied up in the Polar ice caps, the level of the oceans was greatly lower than it is now. At that time, so geologists believe, the western islands of this region were connected with the continent of Asia, while the eastern formed a part of a much larger continent of Australia. On this account the more western of these islands are closely related in their fauna and flora to Asia, while the eastern more commonly have Australian types. Thus the islands of these portions differ considerably despite the fact that all of them are equatorial.

There are five giant islands in this region, as follows:

New Guinea, or Papua	342,232 sq. miles
Borneo	293,496 sq. miles
Sumatra	182,900 sq. miles
Celebes	38,800 sq. miles
Java	51,000 sq. miles

Using these great islands as foci, a bird's-eye view of these East Indies may be attempted.

New Guinea, or Papua, and Its Neighbors

New Guinea is the second largest island in the world, and lies just south of the equator between 130 degrees and 152 degrees east longitude. Almost exactly 1,500 miles in length from its northwestern to its southeastern tip, it is about

390 miles in greatest width. It is much indented and each end is made up of a peninsula much narrower than the main body of the island. In shape it somewhat resembles some mythical legless monster, with its head to the west, and the eastern peninsula forming its tail. Politically it is divided between the Dutch and the British, the line of demarcation coinciding with the 141st meridian, and the Dutch holdings making up the western half of the island. The eastern half, in turn, is divided longitudinally into the Territory of Papua, which is the southern portion of the eastern half of the island, and the mandated territory of New Guinea which is the northern portion. This mandate is administered, together with the Bismarck Archipelago, by Australia. Probably New Guinea contains the largest areas of unexplored territory in the world outside the polar regions.

Running the entire length of the island are connected or merging ranges of high mountains, called the Arfak Range in the northwestern peninsula, the Sneeuw or Snowy Range, and the Bismarck Mountains in central Dutch New Guinea, the Sir Arthur Gordon or Musgrave Range in western Papua, the Albert Victor Range, and, finally, the Owen Stanley Range which runs the length of the island's southeastern peninsula, ending abruptly at the sea still 3,000 feet in height. Mt. Wilhelmina, 15,580 feet, and Mt. Carstensz, 16,404 feet are in the Sneeuw Range. Mt. Owen Stanley, in the Owen Stanley Range, reaches 13,120 feet. Lesser ranges lie nearer the coasts than do these high central ones. The largest rivers are the Mamberamo, which rises in the Bismarck Range and flows to Point d'Urville; the Sepik, which rises in the same vicinity as the Mamberamo but flows east to the northeast coast, and the Fly River which, rising on the south side of the same range in which the others originate, flows southeast to the Gulf of Papua. Both the Sepik and the Fly are navigable for many miles.

Many of the coastal sections of New Guinea are grasslands upon which scattered eucalyptus trees grow. Elsewhere, particularly in the south, there are enormous swamps, and other marshy sections, filled with thickly growing trees and lesser vegetation. In the interior, vast forests, many of them junglelike and difficult to penetrate, cover the slopes to the summits of the lesser mountains. Elsewhere great areas of forest have been destroyed by forest fires, and have grown up with tall grass. Orchids and rhododendron are abundant. Pandanus trees are common, as are palms of various types.

The eastern shores have more rain than the western, and rainfall varies along the coasts from 30 to 130 inches or even more. Temperatures range from 72 degrees to 95 or more at sea level, but naturally fall much lower on the inland peaks, on some of which snow remains throughout the year. At about 3,000 feet the climate is comfortably cool. At 13,000 feet ice forms at night but melts during the day. Fever is widespread along the coasts and even in the interior at altitudes of less than 2,000 feet. The disease is usually mild, but in time it saps vitality. Occasionally, too, it is virulent and quickly fatal.

New Guinea, despite its size, is poor in mammalian life. Mammals that are related to Australian types are not infrequent—wallabies, for instance, and echidnas. There are many species of marsupials. A native pig, a dingo, many species of mice and bats, and a few squirrels are to be found.

The island is remarkable for its birds, hundreds of species having been described. Of these the most remarkable are the many different birds of Paradise which are peculiar to New Guinea and some of the adjacent islands.

Tortoises and turtles are common, and there are many different lizards, salamanders, toads, and frogs. Crocodiles abound, and there are snakes both poisonous and harmless.

Butterflies, moths, and bees are abundant, and many but-

terflies are large and beautiful. Mosquitoes, in many sections, are a pest.

The number of people on the island can only be approximated, but it seems evident that they number about 1,200,000, and white men are few, only 400 being resident in the western half of the island. Ethnically the natives belong, as a whole, to the Melanesian division of the Indo-Pacific races. The Papuans are predominant and occupy almost the whole island except certain eastern portions. They are woolly-haired people, Negroid in type, and have certain curious resemblances to tribes in East Africa. They are rude but inclined to be jolly and boisterous, although they are friendly and are somewhat artistic.

They are tall and in color are black or nearly so. Their noses are prominent, usually curved and high but depressed at the tip. Their foreheads are high, with projecting brows. Their hair is black and is often fluffed out into a large mop, though sometimes it is plaited with grease or mud. Now and then they tie their hair in small bunches, of which, on one man's head, there may be hundreds.

Their society is simple, and they live in villages in which everyone is more or less interrelated. There are no hereditary chiefs, though among some of the more advanced tribes rank is hereditary. Possessions are personally held and pass on to heirs. Land belongs to tribes, but members may take possession of land not appropriated.

Payments, or presents, are always made to brides. Polygamy is not usual, although wives do not object to it. Children belong sometimes to the mother's and sometimes to the father's tribe. Women, generally, are more modest than Polynesian women, but are drudges.

They have vague ideas of a universal spirit, together with a belief in a number of evil spirits. Monoin, one of these, is very powerful and is said to live in the woods. Narwoje lives in the clouds, Faknik in the sea rocks. It is he who

raises storms. There are certain crude carved figures or "Karwars" into which the spirits of the recently dead are invited to go in order to protect the people from enemies and to bring success in various enterprises.

Houses are almost always built on piles, and are sometimes unusually high and long. In parts of the island immense communal houses are found, which may measure as much as 50 or 60 feet in height and 600 or 700 feet in length, with roofs thatched with palm branches. Inside, the houses are divided into compartments. Usually, however, each family has its own house. On the north coast, the native dwellings are not built on piles.

They carve wood, make pottery, and build excellent canoes. Their larger boats are called "lakatois" and are made of several dugouts lashed side by side, so that their overall width is sometimes more than 20 feet. These are decked over and fitted with two masts and large, peculiarly shaped, decorative sails.

Papuans are fond of music and make flutes, reed "pipes-o'-Pan," and drums. They have certain simple dances but do not sing.

Their weapons are bows and arrows, knives sometimes made of bamboo, clubs, spears, and shields. Until recently they have been ignorant of iron but make axes and other edged tools of stone and shell.

The Papuan numerals extend only to 5. Some more ignorant tribes go only to 3. One limited tribe has names for only 1 and 2; 3, with them, is 2 plus 1. Cannibalism was formerly widespread in and about New Guinea and no doubt is still practiced in out of the way regions.

Despite its great size there are no cities on New Guinea and few towns of any consequence. Port Moresby on the Gulf of Papua, Manokwari on Geelvink Bay, Merauke on the south coast, and Fakfak in northwestern Dutch New Guinea are the most important, but none of these is really

more than a large village. Harbors and inlets are numerous about the island, one of the greatest being Bentuni Gulf, the inner portion of MacCluer Gulf in New Guinea's northwestern peninsula. No harbors are equipped with more than the smallest share of modern port equipment, and most are entirely undeveloped.

Oil has been discovered in Dutch New Guinea east of Geelvink Bay, and coal has been found, but neither have as yet been exploited. The Morobe gold field, however, in the mandated portion of New Guinea, has been developed. These deposits lie 69 miles southeast of Salamaua, and, because of the difficult terrain between the mine and the coast, practically all freight and passengers have been carried back and forth by air. Even the heavy machinery was taken in by air.

Salamaua, the gold field port, is on the northeast coast of New Guinea, and is situated on a narrow neck of land about a mile long and only 300 yards wide. It is made up of a few buildings, two stores, a branch bank, a wireless station, a government office, a hospital, a hotel, and little else. Other towns along this section of the coast are Buna, Morobe, and Lae.

To a greater or lesser extent the climate, fauna, flora, people, customs, and development of New Guinea correspond to those of the near-by islands. The Schouten Island Group in Geelvink Bay off the northwest coast, the Moluccas to the west, Ceram, Tanimbar, Aroe, and Frederick Henry Island, together with the scores of lesser islands and islets all about this greater one, are, so to speak, fragments of New Guinea.

Celebes

The island of Celebes, which lies between New Guinea and Borneo but much nearer the latter, is fantastically

shaped. It consists of a comparatively small central portion to which are attached four huge, irregular peninsulas. One of these extends south, one southeast, one northeast, and the fourth starts north, turns east, and finally north again before ending some 400 miles from where it begins. Because of this irregularity it is difficult to give its dimensions. Suffice to say that the greatest dimension is from the tip of the southern peninsula to the tip of the crooked northern one—a distance of about 600 miles—and no portion of the island is more than 60 miles from the sea.

The island is mountainous and rugged, with a ridge of sorts running the length of each of its peninsulas, in which are many gorges, chasms, and precipices. These precipices are sheer and unscalable; indeed their sides sometimes actually overhang, though their height may be 500 or 600 feet. These are common on the southern peninsula, where the island's highest peak reaches 11,467 feet, though it is this peninsula that is most developed.

A considerable part of the island is still unexplored, and much is covered by dense jungles hard to traverse. There are no great river basins or plains, but at various elevations there are often large stretches of level grasslands. The southeastern peninsula contains two parallel mountain ranges, between which lies a vast swamp. Certain rivers are navigable for large native craft for a short distance at their mouths.

The climate is everywhere influenced by the nearness of the sea. Extremes of temperature, therefore, are not great and the thermometer along the coast is likely always to remain somewhere between 70 and 90 degrees. At higher elevations, of course, lower temperatures are experienced.

Rainfall ranges from about 102 inches annually in the north to 157 in the south, and the west coast receives somewhat more than the east.

The vegetation is very rich, although the soil does not support many large trees. Sandal, ebony, and teak are

among the largest. Bamboo and palms are common. Coco-nuts and sago palms, breadfruit and tamarind, lemons, oranges, plums, sugar cane, melons, and pepper are among the island's many crops, and indigo, cotton, tobacco, and an inferior rice are also raised. Gold, tin, iron, and copper have been found in small quantities.

Celebes is a part of the Dutch East Indies and is governed from Batavia, Java. The population of the island is 3,089,000. The coast is dangerous because of coral reefs, and there are only three good ports: Makassar in the south; Gorontalo on the south coast of the north peninsula, and Menado at the tip of the same peninsula.

Borneo

Lying between Celebes and the Malay Peninsula is the island of Borneo, the third largest in the world. Its northernmost portion is British North Borneo. Southwest of this division is lesser Brunei, also British-controlled, and the remainder of the northwest coastal portion is the semi-independent region of Sarawak which is under British protection. The rest of the island is Dutch.

The island is mostly mountainous, though none of the ranges are excessively high and they radiate, more or less irregularly, from the central region but with no clear focus. The highest peak in the island is Mt. Kinabalu, 13,451 feet, within 75 miles of the extreme northern tip. From north to southwest the island measures about 875 miles, and its greatest width is far to the south where it is about 600 miles across.

The coastal regions of Borneo are, generally speaking, low alluvial lands which are marshy or swampy. Some coastal regions are sandy and are fringed by countless casuarina trees, and elsewhere there are deep mudbanks upon which mangroves grow densely. The water offshore is usually shallow—1 to 3 fathoms—and there are few sat-

isfactory ports. The towns are consequently found near the mouths of those rivers that do not have sand or mudbanks to interfere with shipping. The islands off the coast are neither numerous nor important.

The sluggish, winding rivers of Borneo are important, for they offer the only means of inland transportation, and the population of the island tends to live beside them.

Among the most important rivers of the northern part of the island are the Padas, the Rejang, and the Brunei. The Rejang, which is navigable for more than 100 miles, lies wholly within the dependency of Sarawak. The Brunei (or Limbang) River is in the dependency of Brunei. The Padas is smaller and enters the South China Sea on the western coast of British North Borneo. In Dutch Borneo the Kapuas River is navigable for small river steamers for 400 miles. The Kutei, which flows crookedly east, has a full 18 feet of depth for many miles into the interior.

In a tropical island so well watered and extensive and lying directly on the equator, the climate is naturally hot and humid. The average temperature is about 80 degrees, but, except at considerable elevations, it never falls below 70, and not infrequently approaches 100 in the shade—an excessive temperature when the highly humid atmosphere is considered. The seasons are not clearly marked and, in effect, the climate is about the same throughout the year. Few days are without rain, but more rain falls from November to May. During this season rainfall is often torrential, and storms are frequent. The vegetation throughout the island is dense and luxuriant.

Malaria is common, but except for certain notably unhealthy localities the island is not disease-ridden. The native diseases are usually the result of incorrect diet or filth, and these causes account for the cholera, ophthalmia, ringworm, and other diseases that are common. Smallpox,

dysentery, and fevers are widely endemic, and now and then become epidemic.

The flora of the island is especially rich. A large tree called the tapan is one of the most impressive. Ironwood, palms of various kinds, rubber trees, various trees from which spices are obtained, and all tropical fruits and vegetables are common. Rice, cotton, indigo, coffee, pepper, and many other products are raised commercially, though rubber is one of the most important. Orchids, parasitic plants, and ferns teem prolifically in the sodden jungles.

The fauna of Borneo is greatly more impressive than that of any of the islands to the east. The orangutan and many monkeys are native to the island. A small tiger and a small panther live in the jungles, and elephants and rhinoceroses, though not common, are sometimes observed in the north. Wild pigs and wild oxen are on the island, as well as many deer, including one species the size of a hare. Squirrels, porcupines, rats, bats, "flying fox" bats, and flying frogs are also found. Crocodiles lurk in the many rivers and swamps, and snakes, many of which are poisonous, are widespread and of every size, from boa constrictors down. The swamps and marshes are teeming with leeches.

The variety of bird life is not great, though there are eagles, falcons, vultures, owls, hornbills, peacock-pheasants, and others. Swifts that construct edible nests inhabit many of the limestone caves.

Ticks are troublesome and sand flies and mosquitoes are pests. There are "fire ants" and "pepper ants" whose names derive from the sharpness of their bite.

Fish are plentiful in the rivers and even in the swamps.

Domestic animals are dogs, cats, pigs, fowl, small horses, and buffalo.

The mineral wealth of Borneo is considerable and the oilfields are among the most important in the Far East.

The greatest field is that of Balikpapan on the southeast in Dutch territory. Another Dutch field is on the offshore island of Tarakan, near the northeast coast. Three closely grouped British fields lie in Brunei and in Sarawak on the northeast coast.

In addition to oil, Borneo produces some gold, diamonds, and coal. Its important agricultural products are rubber, ironwood, copra, and resin. In 1939 the rubber production of the island exceeded 2,000,000 tons.

There are no large towns on the island. The capital of Dutch Borneo is Banjarmasin on the Barito River near the southern coast. Balikpapan is the main Dutch oil town on the southeast coast. Samarinda, near the mouth of the Kutai River, and Pontianak near the mouth of the Kapuas are the only Dutch towns of importance. Kuching, or Sarawak, is the capital of Sarawak. Sandakan, in British North Borneo, and Brunei in Brunei, are the only other towns of any importance.

The population of the island is 2,300,000, of which number only about 8,000 are Europeans.

Sumatra

Sumatra is the westernmost of the great islands of the East Indies. Separated from the Malay Peninsula only by the narrow Straits of Malacca, its great length extends from northwest to southeast for nearly 1,150 miles. Its greatest width is 225 miles about halfway down its length, but near its northern end it is only about 100. In a chain that parallels its west coast lies a series of good-sized islands, and others lie close to its east coast.

The island is straight and its features are greatly less complicated than those of Borneo. A high mountain range—the Bukit Barisan—runs the full length of the island near its western coast, reaching its greatest elevation in Mt. Kerintji (12,484 feet) about midway of its length.

There are many volcanic peaks that range from 5,000 to 12,000 feet. Thus the streams flowing west are short and swift, while those flowing east cross extensive alluvial plains to wide deltas, some of which have many channels winding through them. These eastern streams are the island's best means of interior communication. Much of the island is matted thickly with jungle, though there are wide plains areas where trees are dotted about the grasslands.

The climate is hot and frequently humid. The prevailing winds are northeast and southwest, and both bring rains if they blow for any considerable time. Rainfall, however, is heavier in the west than in the east, reaching about 139 inches annually at its greatest.

Many grasses that are tall and rank are an important part of the flora of Sumatra. So sturdy and assertive are some of the Sumatran grasses that once a portion of the forest has been cut, they establish a riveted foothold in the soil and the forest finds it difficult or impossible to regain the ground it has lost. This has proved to be serious because the natives have often been careless in their destruction of trees.

In Sumatra, pine trees (*Pinus merkusii*) are to be found growing almost to the equator, and in the south many trees are of species characteristic of Australia. Rubber trees have done well on the island. Coconut, areng, sago, and areca palms furnish fruit in abundance, as well as tamarind, orange, lemon, pomegranate, guava, and papaw trees. Pepper has been a product of Sumatra since long before the coming of white men.

The economic development of Sumatra surpasses that of any other island, with the exception of Java, in the East Indies. Agricultural development, in some sections, is considerable, and the main agricultural products are rice, coffee, pepper, and rubber. Tea and sisal are also grown.

The island is rich in minerals. It produces lead, silver,

sulphur, and coal. Near Palembang in the south central portion are several oil fields, and others lie in the north near Medan. Close to Sumatra's east coast are the tin-producing islands of Banka and Billiton, and bauxite is mined on the island of Bintan which is a member of the crowded Riouw Archipelago off the east coast near Singapore.

The principal harbors of Sumatra are Padang on the west coast, Palembang, on the Musi River near the south-east coast, and Belevan in the north. Medan, in the north, is the island's capital.

Sumatra has a railroad system that serves all its principal centers, but is not yet unified throughout the island. A good highway system, however, linking up all the important towns has been created.

The population is 8,900,000 of whom about 21,000 are Europeans.

The Island of Java

The western end of Java is separated from the south-eastern tip of Sumatra by Sunda Straits, a narrow passage only 14 miles in width, and Java's length lies directly east and west. It is 670 miles long and 122 miles across at its widest point, though near its center it is 60 miles from north to south. The 100-mile island of Madoera which lies just off the Javan naval base of Surabaya is, for all practical purposes, almost an integral part of the larger island.

Both politically and commercially this island is the center of the Dutch East Indies, and is, by all odds, the most developed and important island in the region, with its population of 47,800,000, or two thirds of the total of all these eastern holdings of the Netherlands. In fact, the population of Java alone is six times that of Holland itself, which is the third most heavily populated land in the world. The population density of Java is almost twice that of Japan and more than twice that of Germany, while it is nearly

four times that of China, and seven times India's. No other land in the world has so great a population density.

Java is naturally divided into three parts: the wide western portion; the narrow central portion; and the wide east portion.

In western Java the more elevated portions lie near the southern coast with a low-lying region to the north. Many of the peaks are volcanic. Central Java differs from western in that the mountains lie about midway between the north and south coasts, and the coastal plains are much more limited. In Eastern Java the mountains and the lowlands are intermixed and irregular and the island's greatest elevation—Mt. Mahameroe, 12,060 feet—is among them. In general the entire southern coast of the island is rocky and inaccessible.

Java is volcanic in origin and contains a surprising number of volcanoes. At least 108 of them are on the island, 13 of which are active, though some of them merely steam or occasionally throw out a little scoriae. This volcanic origin explains the island's fertility, and also explains why certain areas are less fertile.

Near the south coast are many marshy areas which are useful for little besides the growing of rice. The narrow northern coastal plains of eastern Java are made up, in large part, of clay and chalk and so have small fertility, and some of these are low and swampy. In fact, almost the whole north coast is a region of mangrove swamps, marshes, and ponds, intermixed with sand dunes and river mouths that shift. The sand dunes often lie in ridges sometimes 50 feet in height and extend inland, at times for a quarter of a mile. They, too, shift under the influences of the waves and the wind, and among them lagoons are to be found.

The island as a whole is remarkably rich in its flora. The nipa palm and many others thrive in its soil. The grass-

lands frequently are covered with silvery alang-alang which is 2 to 3 feet tall, and bamboo grows luxuriantly. The forests are tropical, and in the west are especially thick, with many vines and tall trees, which are often thickly festooned with parasites and covered with fungi, some of which are vivid vermilion. The island has many ferns and more than 500 varieties of orchids. Some lianas grow hundreds of feet in length. On the higher mountain slopes the forests are chiefly of oak and chestnut. Three to four hundred species of trees are productive of useful timber, of which teak is the most valuable.

Considering the enormous population it is surprising that only about one third of the island is under cultivation. Rice is an important crop, and rubber, sugar cane, cinchona, tobacco, coffee, tea, cocoa, pepper, and indigo are also raised in quantity.

The fauna of the island is varied and includes a one-horned rhinoceros that is native to Java. Bantengs, deer, tigers, leopards, wild cats, wild dogs, "flying fox" bats and lesser ones, apes, and many other species are found on the island.

Nearly 500 different kinds of birds have been observed, but few of these are indigenous to Java. Most common and numerous are hornbills, peacocks, parrots, cuckoos, hawks, falcons, honey birds, and swallows.

Fish are abundant, and some are poisonous. Lizards and crocodiles and more than a hundred species of snakes, including the cobra and the adder, as well as many ants, termites, and mosquitoes, infest the dense, humid jungles. Large spiders capable of killing small birds, and huge beetles are known.

To the east a chain of large islands exactly continues the direction set by Java and extends for more than 600 miles with only narrow straits between them, and all of these

islands, except for their dimensions and the sizes of their populations, more or less duplicate Java.

The oil fields of Java are in the eastern portion of the island and on the adjacent island of Madoera, and the refineries are near Surabaya. Gold, sulphur, and manganese are also produced on the island. The railroads are thoroughly developed and reach every important town on the island, while the highway system is excellent. Air lines, too, have long connected Java not only with other East Indian islands but also with Australia and Europe.

Batavia, with a population of 590,000, of whom about 40,000 are Europeans, is one of the great cities of the Far East, and is the capital and leading commercial center of the Dutch East Indies. Surabaya, with 356,000 population, is the second-ranking commercial center and the naval base for these islands. About 26,000 Europeans live there. The harbor entrance is protected by forts on Madoera Island and by a military airfield. The city also has an ordnance plant. It lies 400 miles east of Batavia. Another important city is Buitenzorg, which is 30 miles from Batavia and is the residence of the governor general. Its population is 65,000, of whom about 5,000 are Europeans. The famous Botanical Gardens are at Buitenzorg.

The climate of much of the Netherlands Indies is peculiarly equable. In Java a temperature as high as 97 degrees has not been officially recorded at Batavia since 1877, and the lowest temperature known—66 degrees—was recorded the same year. The monsoon winds chiefly regulate the rainfall, and the season of least rain is from May to August, while December, January, and February have the most.

The total population of the Dutch East Indies is about 65,000,000, of whom only 240,000 are Europeans, and 1,500,000 are Chinese.

Generally speaking, the native population of these islands are the Malays who predominate in the western part of the archipelago, and the Papuans who live to the east, though there is no sharp dividing line between them. Most of the inhabitants of Celebes, Borneo, Sumatra, and Java are Malays, who are a brown race, small, slender, generally attractive, and intelligent.

There are some 137 different tribes and groups, differing in type and in language, and they have long been Mohammedans, though they are not very strict in their religious observances. Many Hindu influences have left their mark on these people and their civilization is sometimes called Indonesian on that account.

The Malay language which is used throughout the coastal districts is used widely through the archipelago, but other languages are spoken. The most highly developed of these is Javanese.

The civilization of these islands is high. Architecture, sculpture, music, dancing, and literature have all reached a high stage of development.

The residents of the coastal districts are usually maritime people, and formerly, even to the middle of the nineteenth century, were often fierce pirates. For the most part they are now peaceful fisherfolk and competent seamen. Inland they usually like to live near rivers, though in crowded Java this is less evident. Their houses are frequently built on high posts, and coconuts, sugar palms, and fruit trees are planted around them. Rice is a staple food. They weave excellent fabrics, work in metal—especially silver and brass—and make pottery. They long ago developed the art of writing.

They are courteous and self-respecting, with a rigid code of manners. Their indolence breeds a certain improvidence, and they are fond of bright clothing, comfort, and ease. Morally they are lax. Polygamy is permitted by their

religion, but is usually practiced only by the wealthy. They are aristocratic and loyal to their chiefs and rajahs. They can be, and sometimes are, cruel and selfish.

The men wear loose coats and trousers, and the women wear the "sarong," a silk or cotton cloth about two yards long which is wrapped around the waist, knotted, and allowed to fall skirtlike to the ankle. The men also wear it, folding it over the hilt of the large knife they often carry at their waists, and then letting it fall almost to the knee.

Their language uses the five vowels, both long and short, and the one diphthong *au*. The consonants in use are *ng*, *ch*, *ñ*, *k*, *g*, *j*, *t*, *d*, *m*, *n*, *p*, *b*, *y*, *r*, *l*, *w*, *s*, and *h*. The language is simple but indefinite. Number and gender can be distinguished only with difficulty. Plurality is usually expressed by some adjective, such as *Banak*, meaning many, or *Sagala* meaning all. Adjectives are placed after the noun. Verbs have neither person nor tense, number nor mood, and long sentences are rarely used. The language frequently uses idiomatic expressions, which makes it difficult to learn, and is parsimonious in the use of personal pronouns.

The Portuguese were the first to arrive in this region, in 1509, and the eastern half of the island of Timor is a remnant of their early holdings in this portion of the world. Later the Spanish followed. The Dutch first appeared among these islands in 1527, and Sir Francis Drake sailed through these seas in 1579. The first Dutch fleet of consequence to sail for the Far East reached Sumatra in 1596, and in 1602 the Dutch East India Company was organized. This marks the beginning of Dutch influence in the Far East. In the three centuries since then the Dutch have had their difficulties and their reverses, but they constantly enlarged their holdings until they had created their present enormous Eastern empire. By comparison, the British holdings among these islands are small and recent, and

long ago the Dutch surpassed and practically eliminated the Spanish and the Portuguese.

This Dutch Empire is administered by a governor general who is assisted by a council. There are further divisions of authority which include residences, divisions, regencies, districts, and villages. Natives and Chinese hold seats in the councils of many provinces.

These islands are rich in agricultural products but, aside from their rubber, are of greater world interest because of their mineral wealth. The oil and tin of this portion of the world are of great international importance, and shortly before the outbreak of the Second World War the Netherlands East Indian oil wells produced about 58,500,000 barrels of oil a year, or about 3 per cent of the world's total. The greatest of the tin mines of the Far East, however, are not among these islands but lie on the Malay Peninsula. The United States alone, before the outbreak of the Second World War, imported 125,000,000 pounds or more of rubber a year from the Netherlands Indies, though greatly more came from British Malaya.

Hundreds of islands of these crowded seas have not been so much as mentioned in this chapter, but in a region dominated by islands so great as are the greatest five, the lesser islands, almost of necessity, must be lesser replicas of their greater neighbors. Among them are a few with excellent harbors, but otherwise they have little to offer by comparison with the island giants of these shallow, tropical seas.

Strategically this whole region is of worldwide importance. Those who firmly hold these islands guard the vital doorway from the Indian Ocean to the Pacific, without which no one may claim to control the vast Far East. Furthermore, the countless islands are difficult to take from any strong defender, and the narrow straits that

lead through them can be protected from islands that offer a thousand sites for airfields. Here is a huge abatis that presents more serious military problems than any other regions of the kind on earth. Whoever proves to be the victor in the East Indies will prove, at least ultimately, to be the controlling power throughout southern and eastern Asia, as well as in Australia.

CHAPTER ELEVEN

From the Philippines to Alaska

THE ENTIRE EASTERN COAST of Asia from the Malay Peninsula to the greater Siberian peninsula of Kamchatka is paralleled by an almost unbroken line of great archipelagoes and large islands. The most southerly of these are a part of the East Indies, but to the north and east lie other great groups some of which have little or no relationship to the islands of that greatest of island groups.

Northeast of Borneo, and with some of their lesser southern islets actually within sight of that great island, lie the Philippines, an archipelago of great complexity. These islands are usually considered to be a part of the East Indies, and in fauna, flora, and people there are many similarities. This great group, which is approximately 1,200 miles from south to north and about 650 miles in extreme width, contains 3,141 islands, of which, however, 2,775 each measure less than one square mile. The total land area of the group, however, is 115,026 square miles, and two of the islands—Luzon and Mindanao—are very large.

North of the Philippines, and distant only about 90 miles from the northernmost Philippine islet, is the large island of Formosa, or Taiwan. About 260 miles in length, and lying only 100 miles off the coast of China, this island was formerly Chinese territory, but has been held by Japan since 1895.

The southern end of the main Japanese Islands lies about 650 miles to the northwest from Formosa, and scattered in between are the Luchu or Ryukyu Islands which, save for one 100-mile opening, are always within sight of each other all across the intervening sea.

The Japanese islands form a more compact group, with four main islands and upwards of 3,000 other lesser ones. So tightly are they integrated that even including the more loosely connected Kurile Islands, which lie at the northern end of the chain, there is only one channel in the 2,000 miles of the archipelago's entire length that measures so much as 38 miles in width. It is probable that in all this distance there is no other channel across which a large coast defense gun could not fire a projectile. And the final, northernmost, Kurile island lies within sight of the southern tip of Kamchatka.

So continuous are these islands that stretch from the humid tropics to the cold and foggy Kamchatkan coast that it would almost be possible for a boat to follow along them for their entire length without ever being out of sight of land.

The Philippines

The Philippines are, for the most part, of volcanic origin, hilly and, in part, mountainous. The two greatest islands are Luzon (40,969 square miles) in the north and Mindanao (36,292 square miles) in the south, between which lie the other large islands of Mindoro, Masbete, Samar, Panay, Negros, Cebu, Leyte, and Bohol. Palawan, the only other large island, lies clear of the others well to the west with its southern tip just north of Borneo. These range in size from 1,236 to 5,031 square miles in area. There are 20 more that range in size from 100 to 700 square miles, and scattered among the group are the other, lesser 3,120.

There are a dozen active volcanoes in the islands, and

one of these—Mayon, in southern Luzon—erupted twenty-six times in the nineteenth century, twice with great force. Earthquakes are frequent and are sometimes violent.

The flora is, in large part, Malayan in type, and is luxuriant, but many Chinese species are present. Bamboo, coconut and other palms, and banyans are common in the lowlands. Pines flourish on the mountain slopes, and altogether about 800 species of trees are of value commercially or for local use.

Mammals are few, but birds are numerous. Iguanas, crocodiles, and reptiles, including some pythons of great size and many poisonous varieties, are abundant. Both fish and molluscs are plentiful. Bees, termites, locusts, and mosquitoes are found throughout the islands.

The climate is exceedingly hot and humid, with heavy rainfall and heavy tropical storms. At Manila the mean average temperature is about 80 degrees, but there are fairly wide extremes, with 40 degrees or thereabouts the lowest and 100 degrees the highest temperatures.

The soil is fertile, and the minerals of the islands are of value. The deposits of iron ore, for instance, are much greater than those on the Japanese islands.

In this archipelago, whose indigenous population is principally Malayan, there are many people who are Spanish, or partly Spanish in origin, and, except for the small percentage of the total population who make up the native negrito tribes, the people of the islands are civilized, and many are highly cultivated. The population is 16,356,000.

In these islands, with the aid of the United States, the Filipinos have created a modern democracy which, just prior to its invasion by the Japanese in 1941, was on the verge of becoming an independent nation.

Japan

The four principal islands of Japan are Honshu, Hok-

kaido, Kyushu, and Shikoku. Of these Honshu is the largest and by far the most important. Hokkaido is second in size and Kyushu third. In addition to these there are about 3,000 others, but of these smaller members of the group only the 31 islands of the Kurile chain to the north and the 55 islands of the Luchu, or Ryukyu chain to the south are of great importance strategically. Formosa, off the coast of China, and the southern half of the island of Sakhalin, which is close to the coast of Siberia, are also parts (through conquest) of the main Japanese group.

All these islands combined total 173,786 square miles in area. The island of Honshu has an area of 99,373 square miles. Hokkaido, or Yezo, has 30,148, Kyushu's area is 13,778 square miles, and Shikoku's 6,461. Thus Honshu is larger than Oregon; Hokkaido is slightly smaller than Maine; Kyushu is a little larger than Maryland; and Shikoku somewhat larger than Connecticut and Rhode Island combined. The remaining 34,000 square miles of the other islands of Japan slightly exceeds the combined areas of Massachusetts and West Virginia.

The islands are in large part volcanic and are mountainous. Active volcanoes number more than a score and earthquakes are not only frequent but are sometimes disastrous. Much of the area is not arable because of its steepness, but at least 11,000,000 acres are or can be cultivated, without including either Formosa or Sakhalin. Thus, the population of the islands being about 69,000,000, there is about an acre of agricultural land for each 6 people, but despite this the islands are normally exporters of food.

The islands of Japan are sixth in the world in the production of each of the following minerals: gold, silver, coal, copper, and zinc. They produce less iron and are fourteenth in the production of petroleum.

The people are energetic, artistic, and fanatically patriotic. They combine excessive politeness with brutality and

cruelty, and have a deeply ingrained belief in their superiority over other peoples and in their call to rule the world. They believe their emperor to be a direct descendant of the Sun Goddess, who is thought to have founded the country, though their own history tells that the imperial line has run out on a number of occasions and has only been continued by adoptions, or through the offspring of concubines.

Forming a veritable fortress for 2,000 miles along the coast of Asia, these islands and their determined people create one of the world's most serious military problems, and the islands are strategically placed both for attack and for defense. Their greatest weakness in this regard lies in their nearness to China and Siberia, and to the fact that no mid-sea islands that can be used as outer defense works lie between them and the extended Aleutian chain.

The Aleutians

Stretching in a pendant curve as if it were a giant chain fastened at its ends to the vast gate posts of Alaska and Kamchatka are the Aleutian Islands group and their related islands, the Komandorskies. At their eastern end they merge with the long Alaska Peninsula. Toward their western end they almost seem to have been frayed to the breaking point by the gales of these dismal, foggy seas. Volcanic in origin, they extend in their great curve along a line of volcanic fissures in the earth's crust, and are a continuation of the Aleutian Mountains that form the backbone of Alaska Peninsula. Their westernmost island, Attu, is separated from the Komandorskies which lie in the same great curve, by about 200 miles, and this latter group lies only 140 miles off the Kamchatkan coast. The curve, where it starts away from the Alaska Peninsula, is on a southwest line, and, gradually curving to the west, it reaches the latitude of 51 degrees, or about as far south

as Calgary, Alberta, Canada, before curving up slightly to the north of west.

Most of the islands are obviously volcanic, though some contain rocks of other formations, and even amber and lignite are found on some of them. There are many volcanic cones, and a few of them are still active. For the most part the islands are highest adjacent to the Alaska Peninsula and grow progressively lower toward the west, though all the larger ones are elevated and most are definitely mountainous. There is no sign to suggest that they are sinking. On the contrary, slow elevation seems now to be taking place, and on several occasions new islands and reefs have appeared above the sea. There are about 30 islands of some importance, but counting the lesser ones as well they total about 80. The islands usually rise abruptly from the sea, the shore lines are irregular, the bays generally shallow and filled with reefs, and navigation would be difficult even without the constant fog.

The principal islands, from east to west, are as follows:

1. Unimak	11. Amukta	21. Gareloi
2. Akun	12. Seguam	22. Kavalga
3. Akutan	13. Amlia	23. Amatignak
4. Sedanka	14. Atka	24. Semisopochni
5. Unalaska	15. Chugul	25. Amchitka
6. Umnak	16. Great Sitkin	26. Little Sitkin
7. Kagamil	17. Umak	27. Rat
8. Chuginadak	18. Adak	28. Kiska
9. Herbert	19. Kanaga	29. Agattu
10. Yunaska	20. Tanaga	30. Attu

Except for some stunted willows the islands are entirely treeless, and the vegetation is limited to grasses, creeping bushes, and some berry-bearing shrubs. These, however, grow luxuriantly. On the mountain slopes the vegetation is alpine, and there are many mosses and lichens. In the

narrower valleys and on many low isthmuses without good drainage there are small, fresh-water lakes with hummocky shores. These hummocks are covered with sedge grass.

The absence of other kinds of vegetation is not owing to the climate, which is mild, but to the almost constant gales and the perennial fogs which deprive the plants of so much sunshine. A clear day in these islands is a great rarity, and hardly more than 5 or 6 such days may be expected in any year.

The fogs and gales are caused by the meeting of the cold waters of Bering Sea with the warm waters of the Japanese Current. The mean annual temperature is about 40 degrees, with a maximum of about 62, and a minimum of 9 above zero. August is usually the warmest month and February the coldest. It has been said that "there are only two seasons—a long autumn, and a short, mild winter." On the other hand, the constant high winds and gales and the dampness cause the cold to be felt keenly, and even in the warmest weather—or particularly then—almost constant fogs hide the sun.

The most important island of the Aleutians is Unalaska which lies 135 miles southeast of the tip of Alaska Peninsula. It is second in size—Unimak being about twice as large—but the highly irregular shore line is indented to form large Constantine Bay, the inner reaches of which form Dutch Harbor, the principal Aleutian base of the United States Navy.

Unalaska Island is roughly 74 miles from southwest to northeast and is 8 to 12 or 14 miles in width except where a great irregularly oval peninsula about 20 by 33 miles in size projects to the north beyond a short isthmus, 4 or 5 miles wide, by which the two portions of the island are connected. It is on the northern side of this peninsula that Constantine Bay and Dutch Harbor lie.

Constantine Bay is approximately 6 miles wide on the

ocean side, and is somewhat irregular in shape, penetrating the land for some 12 miles. Two thirds of the way in, irregular Amaknak Island, which is $4\frac{1}{2}$ miles in length by $1\frac{1}{4}$ in greatest width, lies close to the southeastern shore of the bay. This divides the inner bay, and Dutch Harbor is that portion which lies to the east, while the western portion, about a mile wide and $3\frac{1}{2}$ miles long, is known as Captain's Bay. The town of Dutch Harbor lies on a narrow midsection of Amaknak Island, and the town of Unalaska lies a mile or so away at a point on the bay shore of the main island from which Amaknak Island is separated by a narrow channel only a few hundred feet in width. A small peak on Amaknak Island reaches 1,640 feet. All about Dutch Harbor and the rest of Constantine Bay peaks rise steeply from the water's edge to elevations as high as 2,300 feet. One that is within hardly more than half a mile of Dutch Harbor is 1,772 feet and another a mile or so away reaches 1,903 feet. The whole of the island of Unalaska is rugged and mountainous, and few areas of any size are level. About 40 peaks range in height from 1,500 to 6,680 feet.

The other islands of the chain are somewhat similar to Unalaska Island except that they lack such good harbors. Many have good-sized streams, which, because of the mountainous nature of the islands, have many waterfalls. There is a large one on Atka Island which lies about half-way down the chain.

On Unimak Island, between which and the end of Alaska Peninsula is large, shallow Bechevin Bay, Mt. Shishaldin reaches 9,387 feet, while there are many others 1,000 to 8,000 feet in height. On Umnak Island, which is just west of Unalaska, there are more than 20 peaks, the highest of which reaches 6,920 feet. Immediately to the west of Umnak is a little cluster of smaller islands called the Islands of the Four Mountains, on which one peak is 8,156 feet, another 7,500, and a third 5,281.

Not far west of this group is Atka Island, on the east side of which is Nazan Bay, while Korovin Bay is on the west. The wide entrances to both of these permit of little protection, and the inner reaches of Nazan Bay are shallow. Atka has several other bays and inlets, but they are of little use, because of reefs, shallows, and lack of protection from gales.

Adak Island, a little to the west, also possesses poor inlets and bays, and the island has four mountains 1,935 to 3,900 feet in elevation.

Kanaga has no harbors, and its tallest peak reaches 4,416 feet. Tanaga Island has a 6,975-foot volcano, and also, on its west side, has open Tanaga Bay. Amchitka Island has a similar harbor, called Constantine, on its eastern side.

Kiska Island, which lies near the end of the Aleutian chain, is about 33 miles in length by 5 to 9 in width. It has the second-best harbor in the archipelago. The island is irregularly shaped, one portion of it being a crude crescent with blunt ends, and with its convex side to the northwest. From this portion a narrow isthmus leads to a large peninsula that runs to the north, and in a large indentation formed between this peninsula and the other portion of the island, and with its entrance to the east, lies Kiska Harbor. Just outside its wide mouth and partially shielding it from easterly winds is Little Kiska Island.

This harbor was long ago set aside as a naval reserve, with the idea of its development as a naval base. Nothing in the way of construction, however, was ever done and it was totally unprepared for defense when, at the time of the Battle of Midway in 1942, the Japanese seized the island.

The rugged interior of Kiska offers nothing of benefit, and only a great effort could turn undeveloped Kiska Harbor into a place of exceptional strength. Fogs and gales and reefs, however, make it difficult to take from any determined defenders.

Only Agattu and Attu lie to the west of Kiska. Agattu

has no harbors, and has several peaks, one being 3,089 feet in height. Attu has open Massacre and Holtz bays, and small Chichagoff Harbor. This island, also, is mountainous.

The mammals of the Aleutians consist mostly of seals, sea otters, and blue and Arctic foxes. The coasts teem with fish and sea birds.

The people of these islands are Aleuts, who, prior to 1745 when the Russians first arrived, are thought to have numbered about 30,000. Fur-bearing animals inhabited these islands and the northern seas in great numbers, and the Aleuts were then thriving. The Russians, however, not only exterminated many of the animals, but went far toward exterminating the Aleuts themselves. In 1910 only 1,232 existed on the islands, though later the number increased somewhat. It is difficult now to arrive at a figure for the Aleuts for there has been some intermixing with whites. Probably pure Aleuts are a little more numerous than formerly. They are now wards of the United States Government and are well cared for. Normally, counting everyone, the population of the islands is now about 3,000.

Aleuts are short, plump, and of good physique. Their necks are short, their faces swarthy, and their eyes and hair are black. They are related to the Eskimos but differ from them widely in language and habits, in disposition and mentality.

Their beliefs are somewhat complicated. Evil spirits called "kugan" cause sickness and death, and are fought by shamans, conjurers, and the spirits of the departed. The souls of the dead visit relatives in order to offer some protection.

Parents and children are much attached to each other. Because of this attachment the corpses of the dead were formerly kept in their dwellings as long as possible, the relatives watching and sleeping near by. Fear of dead relatives is unknown, for they believe the departed are friendly spirits. They long ago learned to mummify the bodies of the

dead, and many of these mummies are preserved in dry caves.

The clothing of the Aleuts, until the coming of white men, was made of skins, with effective waterproofs made of the intestines of the seal. Their boats were skin-covered and of the same form as the Eskimo kayaks.

There are three Aleut dialects: the eastern, or Unalaskan; the central, or Atka; and the western, or Attu. The language belongs to the Eskimo stock.

The Aleuts do not have driving dogs or any other domestic animals. All their settlements are near the shore, and when they venture on the water in their small, one-man skin boats, they never go alone lest help be needed. They use light spears when hunting sea mammals, but ashore they use bows and arrows. Because the sea about the Aleutians never freezes, the Aleuts know nothing of fishing through the ice. Formerly they ate their food—mostly meat and fish—raw, or cooked it on stone slabs. They make thread from some of the native grasses and sometimes weave cloth of amazing softness and fineness, excellent examples of which have the suppleness of silk. Their tools used to be of bone, stone, and wood, and they carve and engrave both bone and ivory.

The Aleuts have been an unfortunate people, and few of them remain. These remnants, however, are now well treated, though it is unlikely that they will ever greatly increase in numbers.

The Komandorskie Islands, which are Russian territory, are in every respect, people and all, similar to the Aleutians.

Economically, the Aleutian Islands have little importance, though the Pribiloff Islands, which lie to the northward of the Aleutian chain and are the home of the great fur seal herds, play a slight economic part. But strategically these islands of the foggy seas are of great importance.

Lying as far west in the north Pacific as New Zealand lies in the south, the Aleutians offer the United States actual and potential bases that are closer to the main Japanese Islands than any other lands except those of Asia or of the Philippines. And no islands lie between Japan and these Aleutian Islands.

Thus, with the increasing range of airplanes, the day is already near when Aleutian bases may serve as springboards for airplane fleets capable of striking important military blows; and in conjunction with Hawaii, which is only 2,106 miles from Unalaska, these northern islands, properly equipped and manned, form powerful bases for the protection of the west coast of North America.

Remote from the world until our own day, the foggy, desolate Aleutians now play a vital role in the offensive and defensive strength of America.

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